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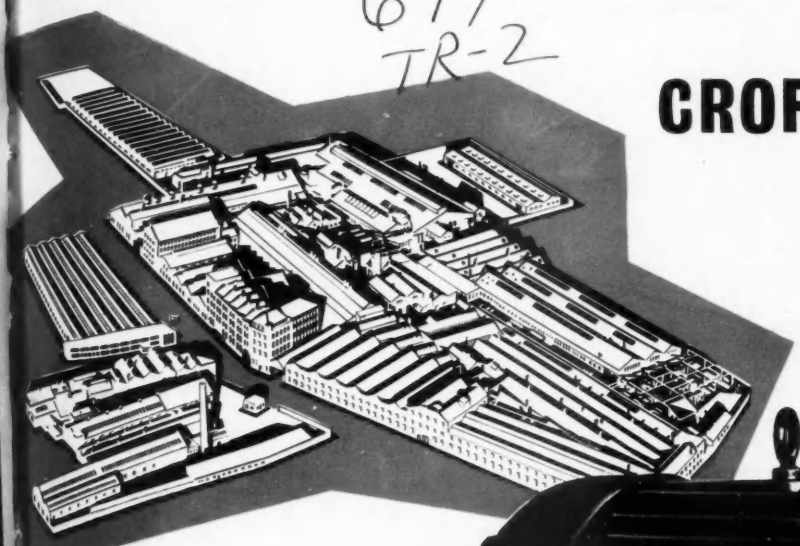

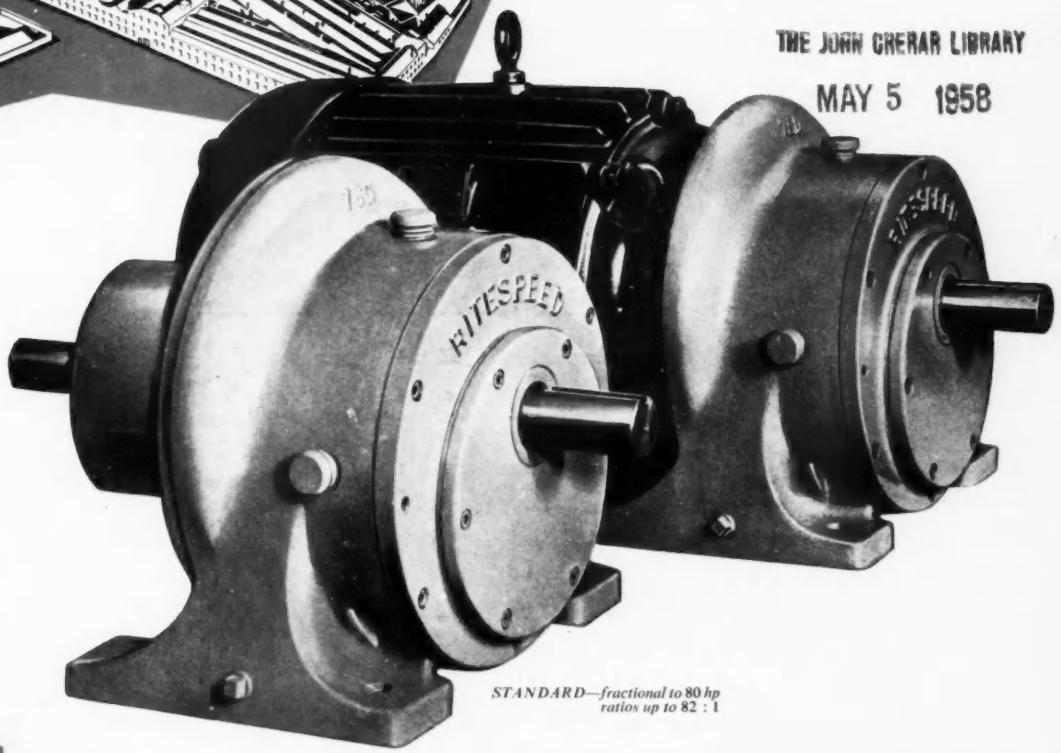

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By S. A. G. CALDWELL, F.T.I.

Nothing in the whole field of fibre technology has achieved any greater degree of success or wider application in the various spinning and weaving sections of the industry than rayon in both filament and staple fibre forms. Increasing recognition of the valuable physical and chemical properties, distinctive characteristics, relatively low cost, and ever widening uses have resulted in a tremendous expansion in recent years. Despite the spectacular advances and the extensive literature available, however, few attempts have been made in any publication to deal specifically and thoroughly with any single aspect of this extremely important subject. Most of the information concerning rayon staple spinning has appeared as articles in the various technical journals or as lectures to the textile societies, but in this new book the author has made a determined effort to compile in one volume as much detail as possible concerning the technique of spinning. Following a concise review of the economics of the industry, the book deals systematically with fibre production and the intrinsic properties, opening, blending, carding, drawing and spinning on the cotton, woollen and worsted, flax and jute type systems, with production and machine calculations and yarn characteristics at every stage. This brief but comprehensive work immediately commends itself as an invaluable source of reference to all engaged or interested in the spinning of rayon staple and future developments.

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CONTENTS

1. Economics of the Industry.
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4. Opening and Blending on the Cotton System.
5. Description and Function of the Revolving Flat, and the Roller and Clearer Card.
6. Drafting on Roller Frames.
7. Cotton-type Spinning-frames.
8. Sliver Forming on Flax- and Jute-type Cards.
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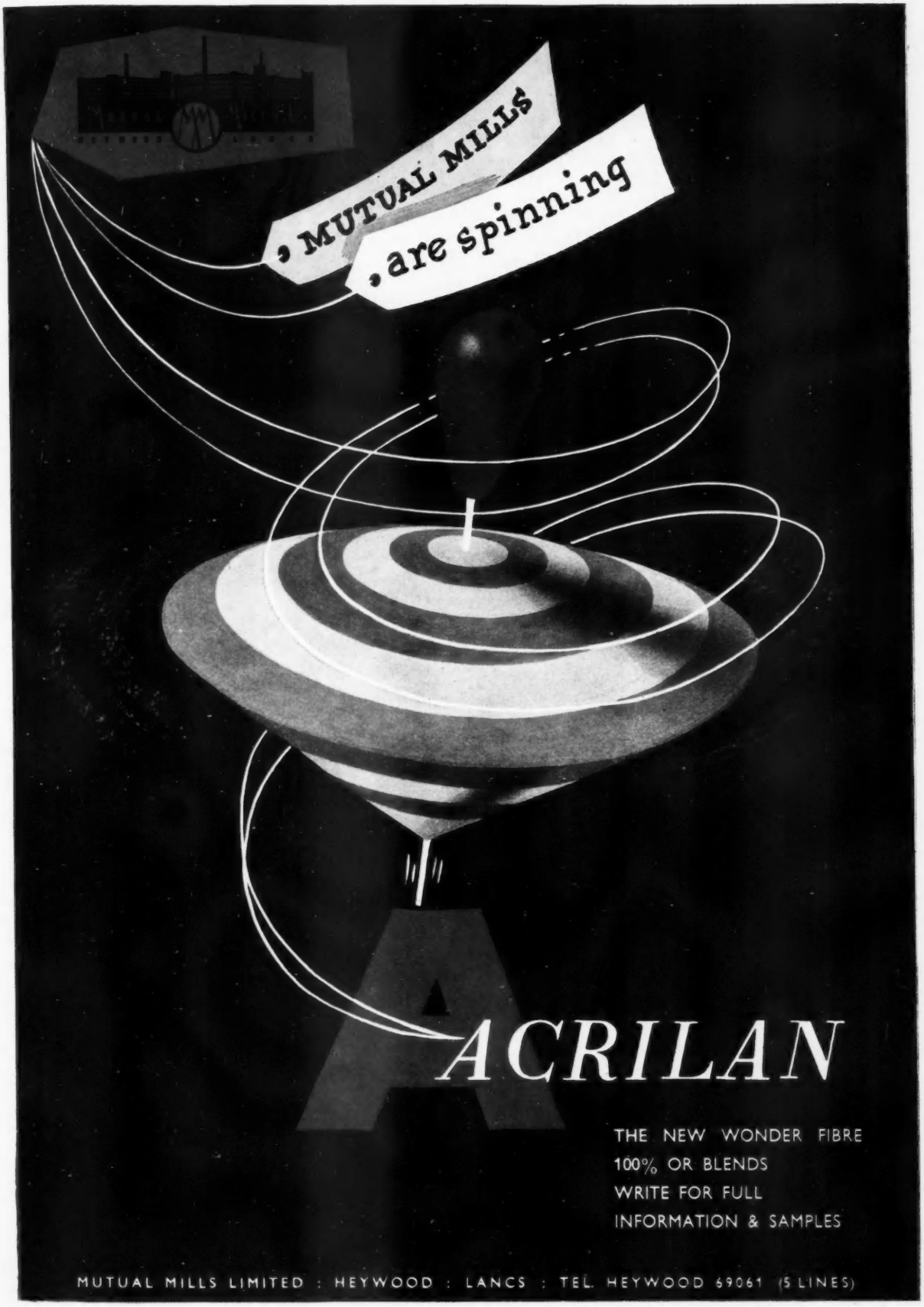
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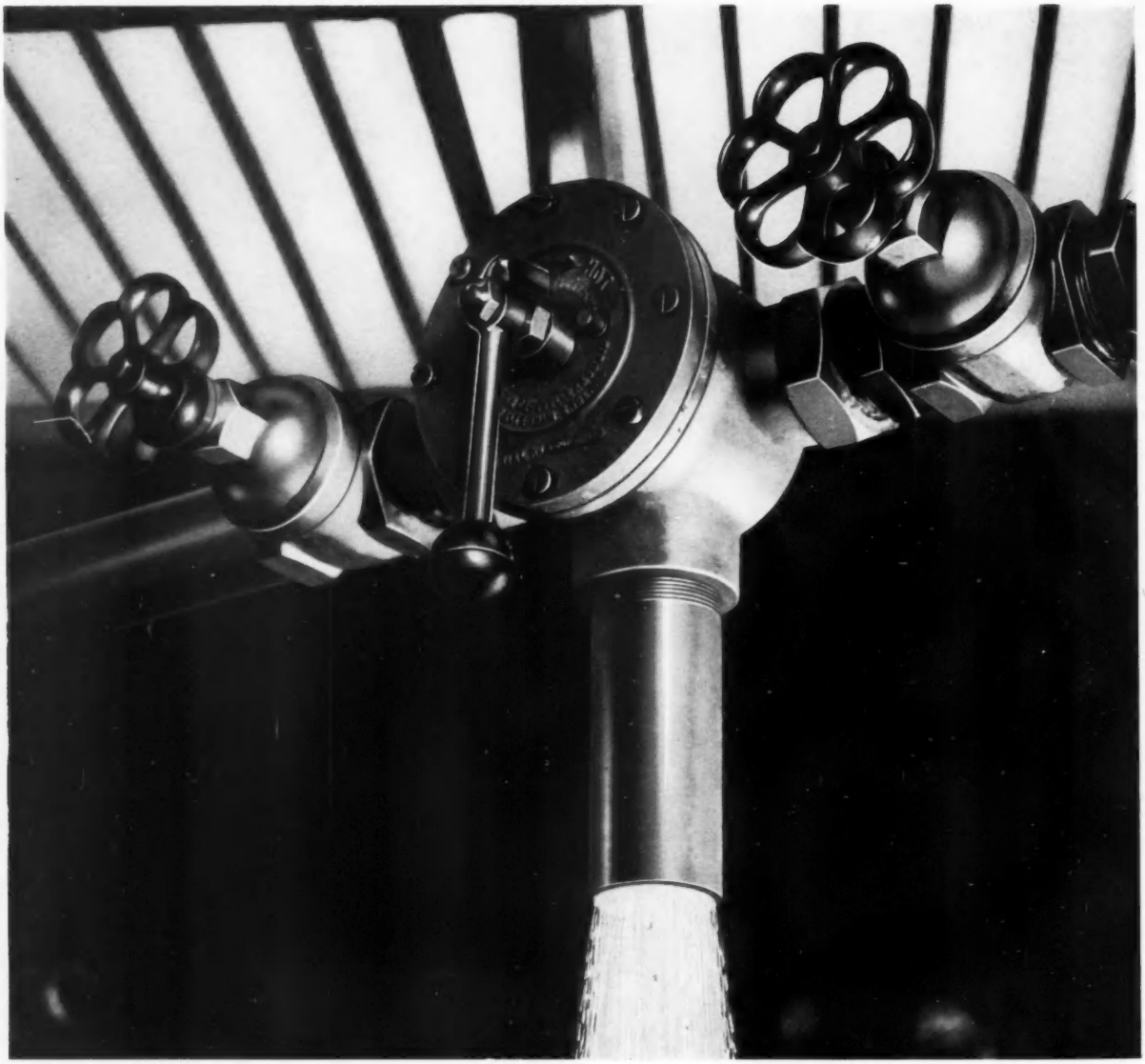

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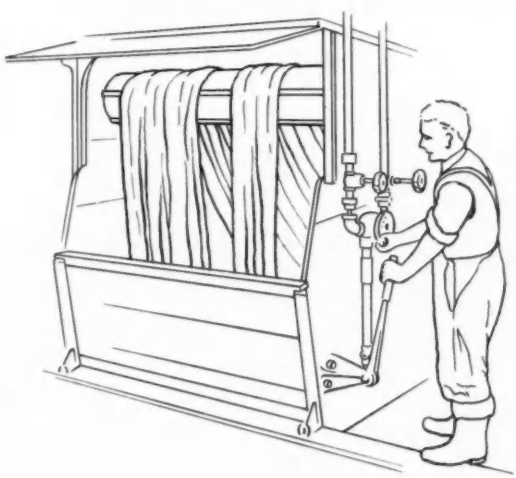

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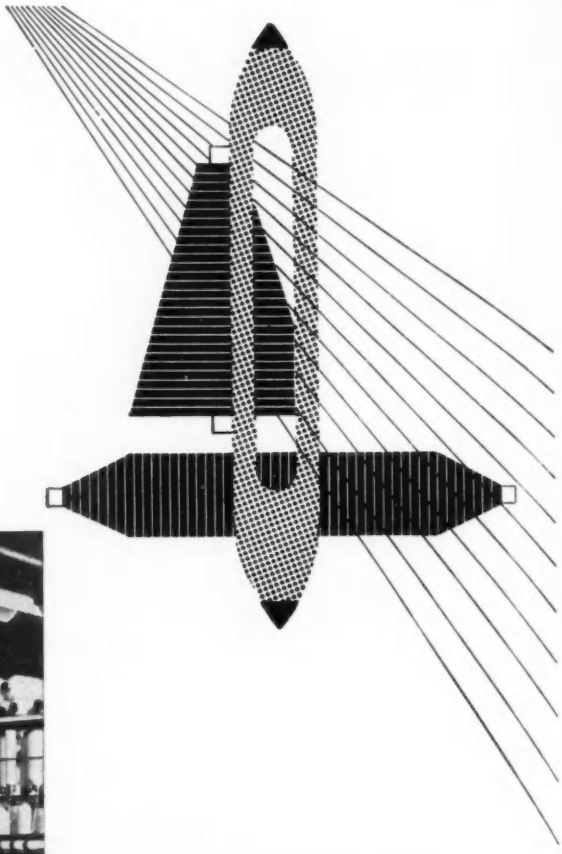

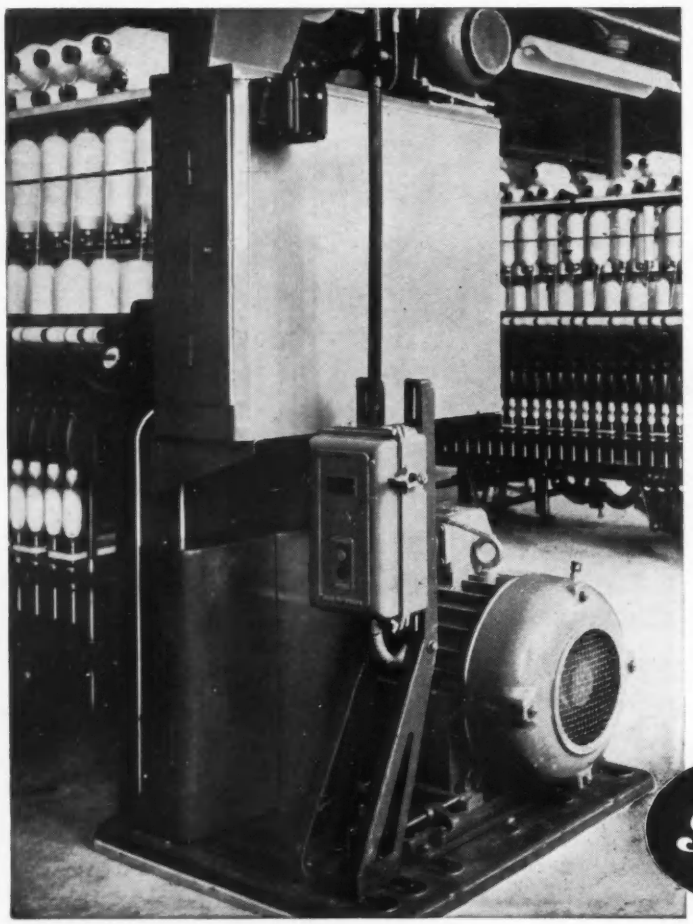

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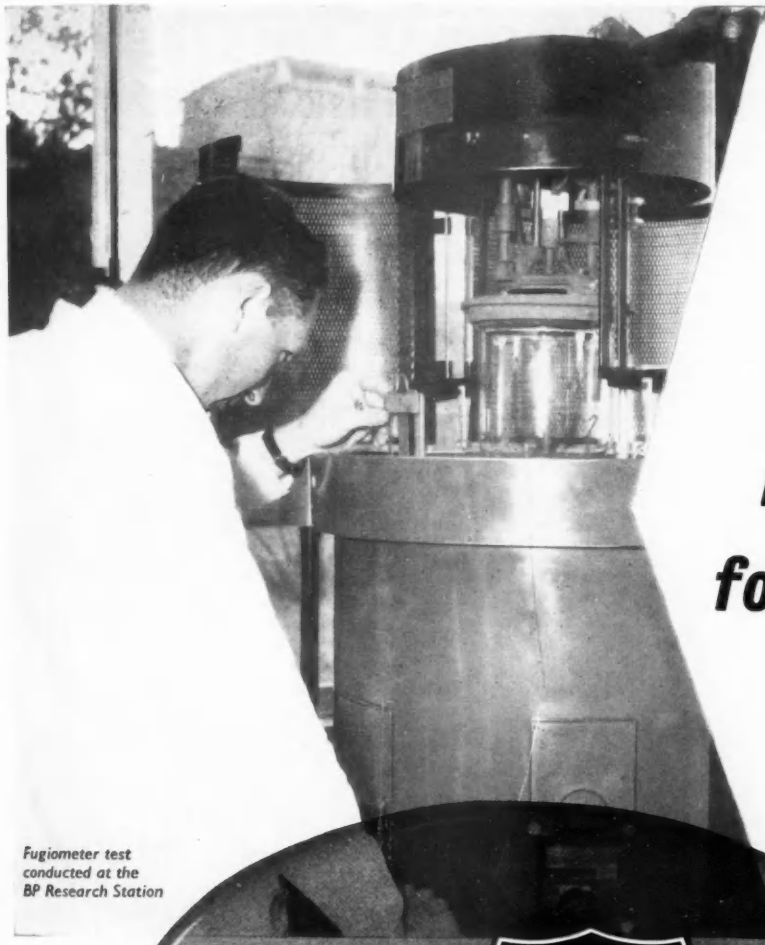

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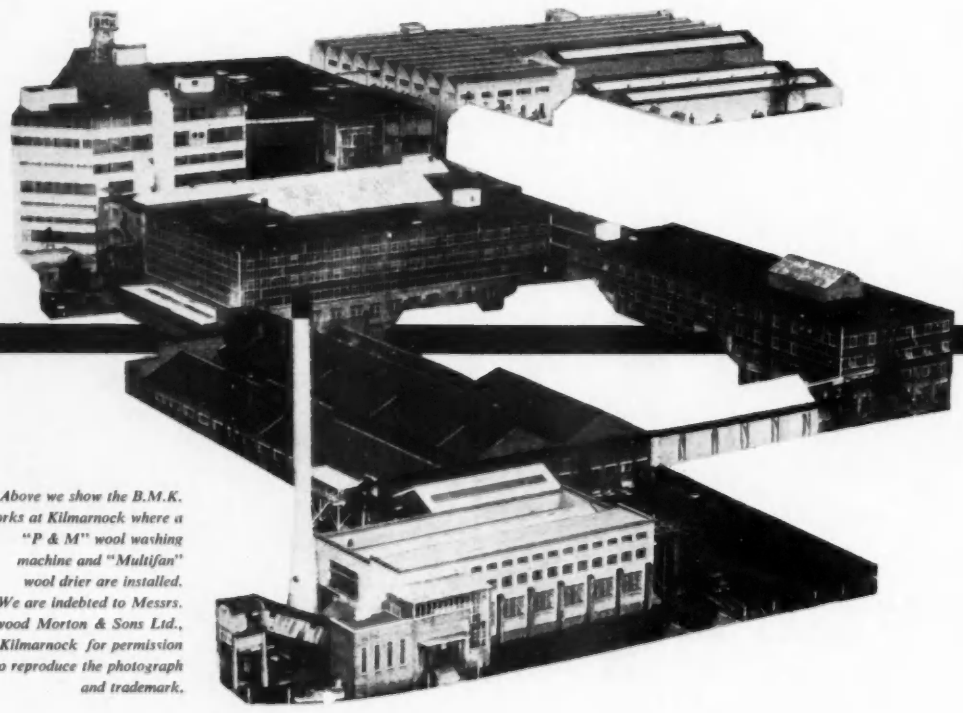

Above we show the B.M.K. works at Kilmarnock where a "P & M" wool washing machine and "Multifan" wool drier are installed. We are indebted to Messrs. Blackwood Morton & Sons Ltd., of Kilmarnock for permission to reproduce the photograph and trademark.

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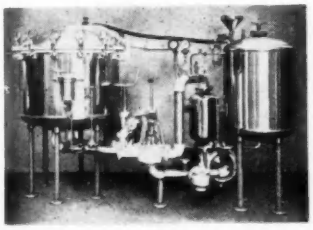

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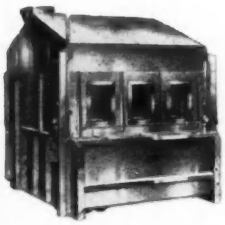

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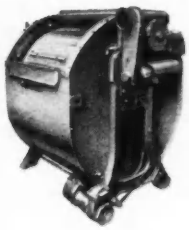
Machines available in several capacities for dyeing knitted fabrics, silk or rayon and woollen or worsted piece goods in rope form.



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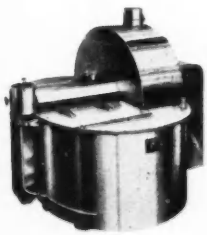
Totally enclosed rotating drum machine for dyeing nylon, pure silk, rayon and cotton hose with perfect penetration and uniformity. Stainless steel in 25, 50, 100, and 200 lbs. capacities.



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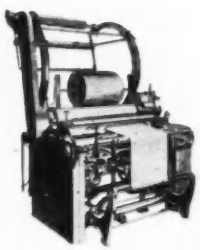
A versatile machine in stainless steel for ladies' hose, half-hose and loose articles. Also used for anti-shrink and bleaching. 4 capacities from 12-200 lbs



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Medium type in 2 sizes with single or twin feed for finished fabric widths up to 59". Light type and continuous blanket heavy type Calenders are also available.

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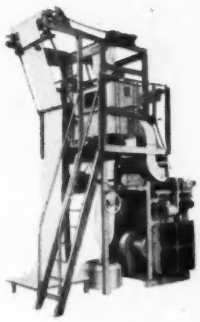

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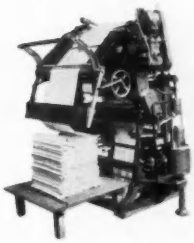
The Pegg-Pasold machine for continuous drying of all circular and warp knitted fabrics in a relaxed condition.



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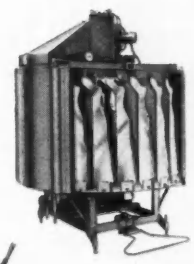

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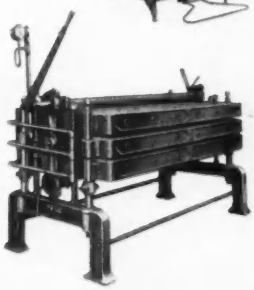
Forms move through circular drying chamber at low temperature to ensure perfect matt finish, to nylon hose.



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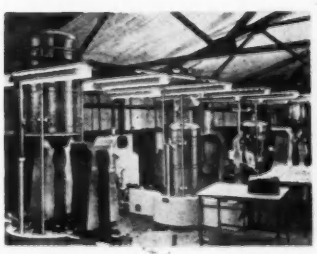
3 and 2 bed presses for finishing all classes of hose, half-hose and similar articles.



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Builders of dyeing machines for loose stock, hanks, packages, piece- goods, fabric and hose ; also finishing machines for all classes of circular knitted and warp loom fabrics and garments. Pre-boarding and finishing machines for nylon hose.

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A versatile design of handling container, now being widely used by textile manufacturers. Available in natural alloy or anodised finish, with or without ventilation perforations (shown on right). Various wheel arrangements and sizes available. Inner dimensions 40¾″x 25½″x 29¼″ high, weight capacities up to 880 lbs.

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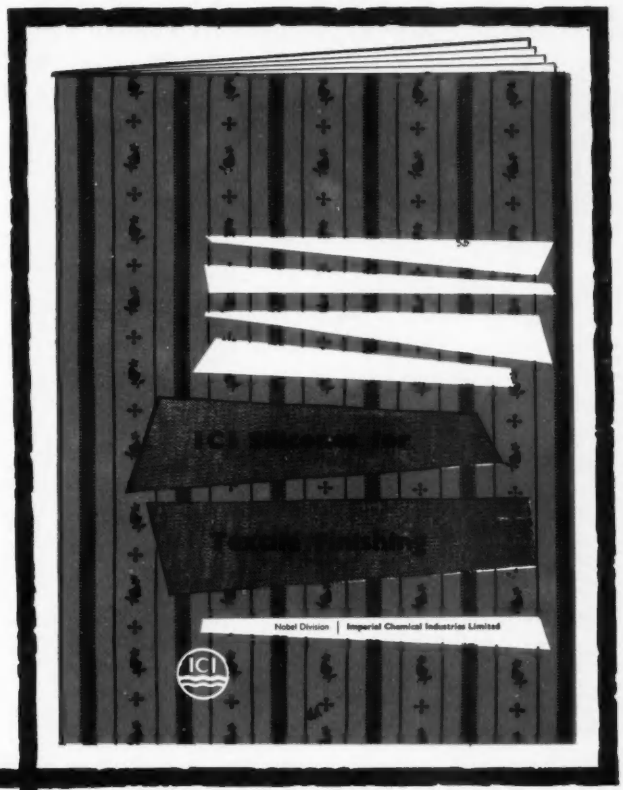

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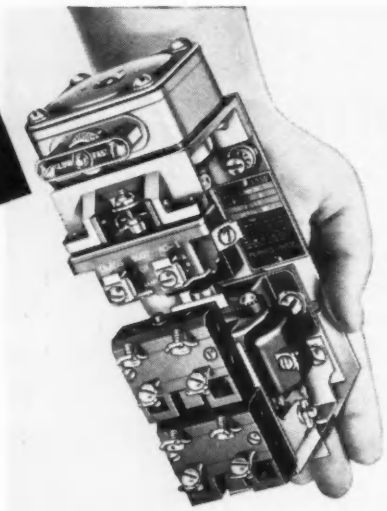

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Class 9050 Pneumatic Timers, the machine tool standard for more than 20 years—are now improved to save 35% of mounting space. As before, the A.C. timers have a range from 0.2 seconds to 3 minutes and accommodate up to 2 n.o. and 2 n.c. auxiliary switches. Available for panel mounting or a variety of enclosures.

New . . . Type B

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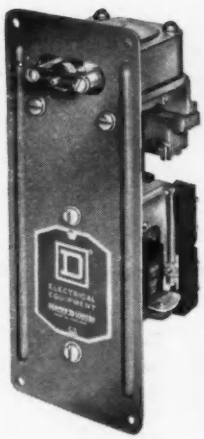

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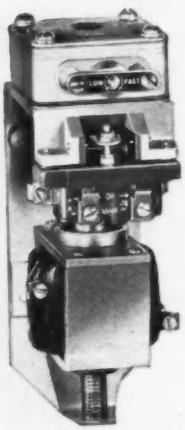

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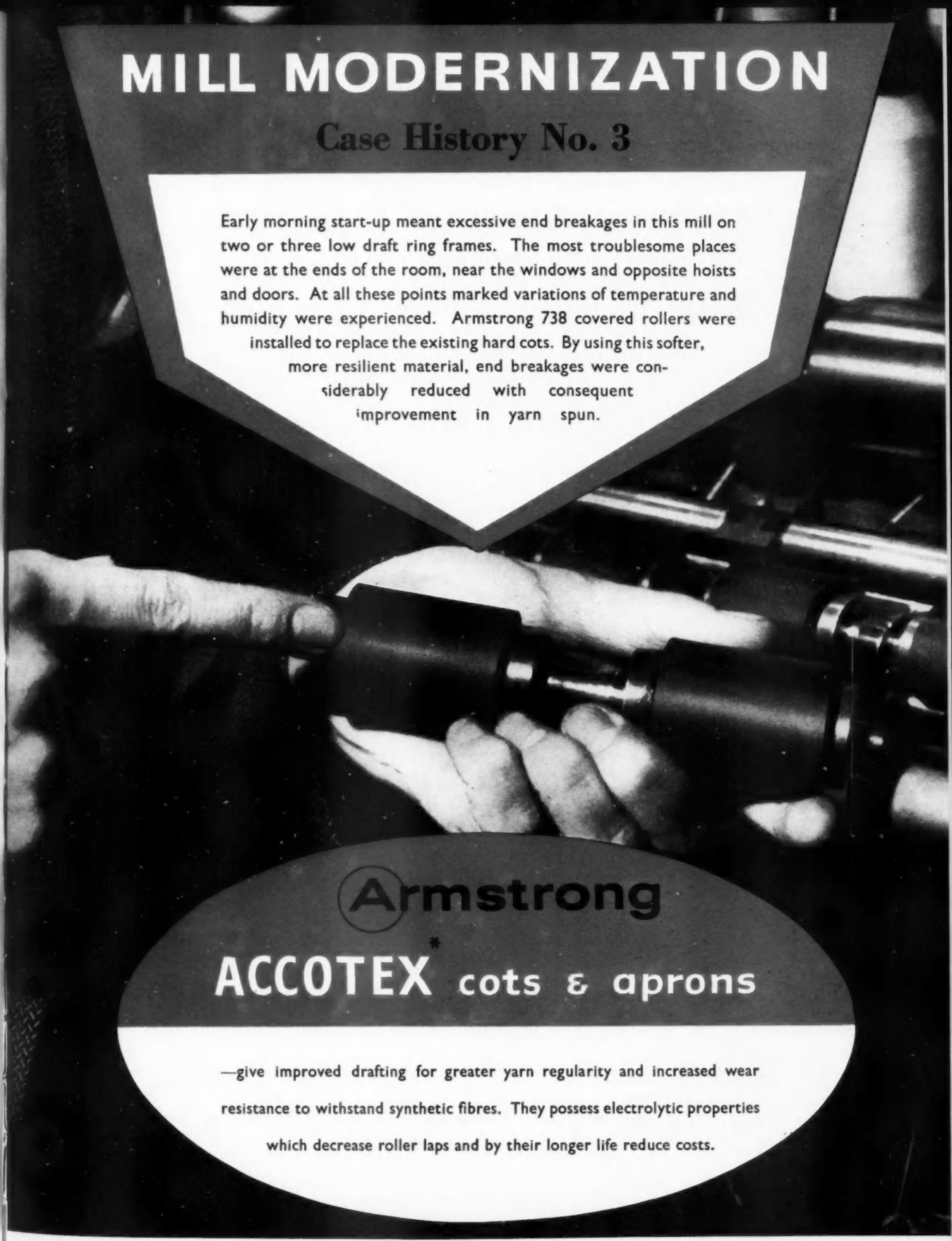

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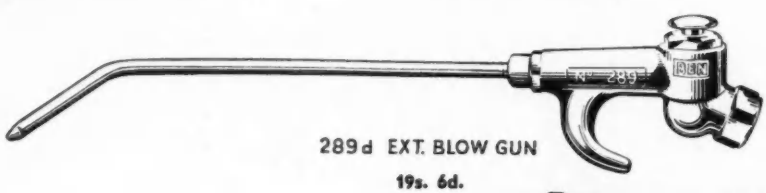

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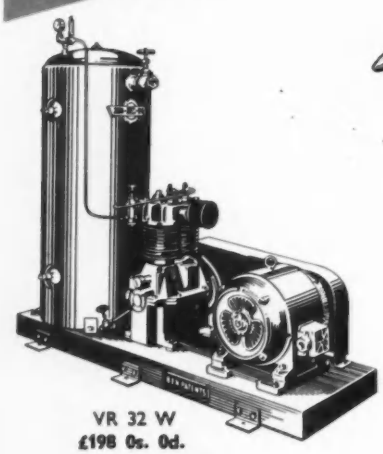

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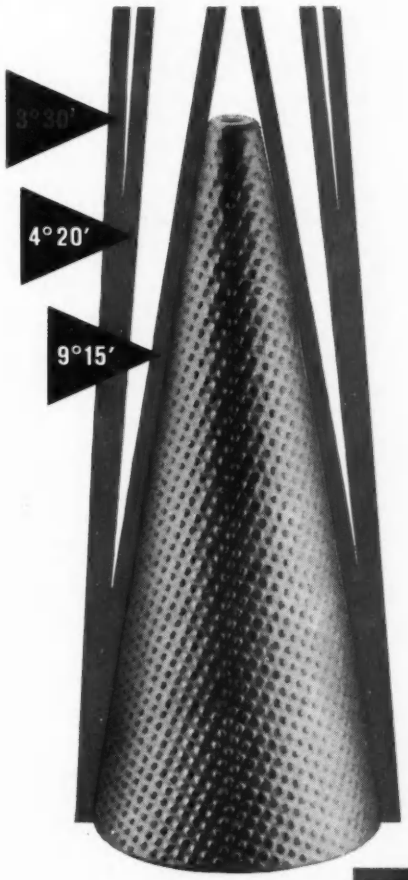
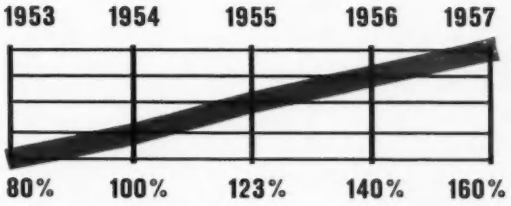


The increased importance of CONES is being reflected by the increased demand and the resultant expansion of our production.



Cones are supplied by us
in all standard tapers
in various colours
in various surface finishes
with different weights
in different impregnations

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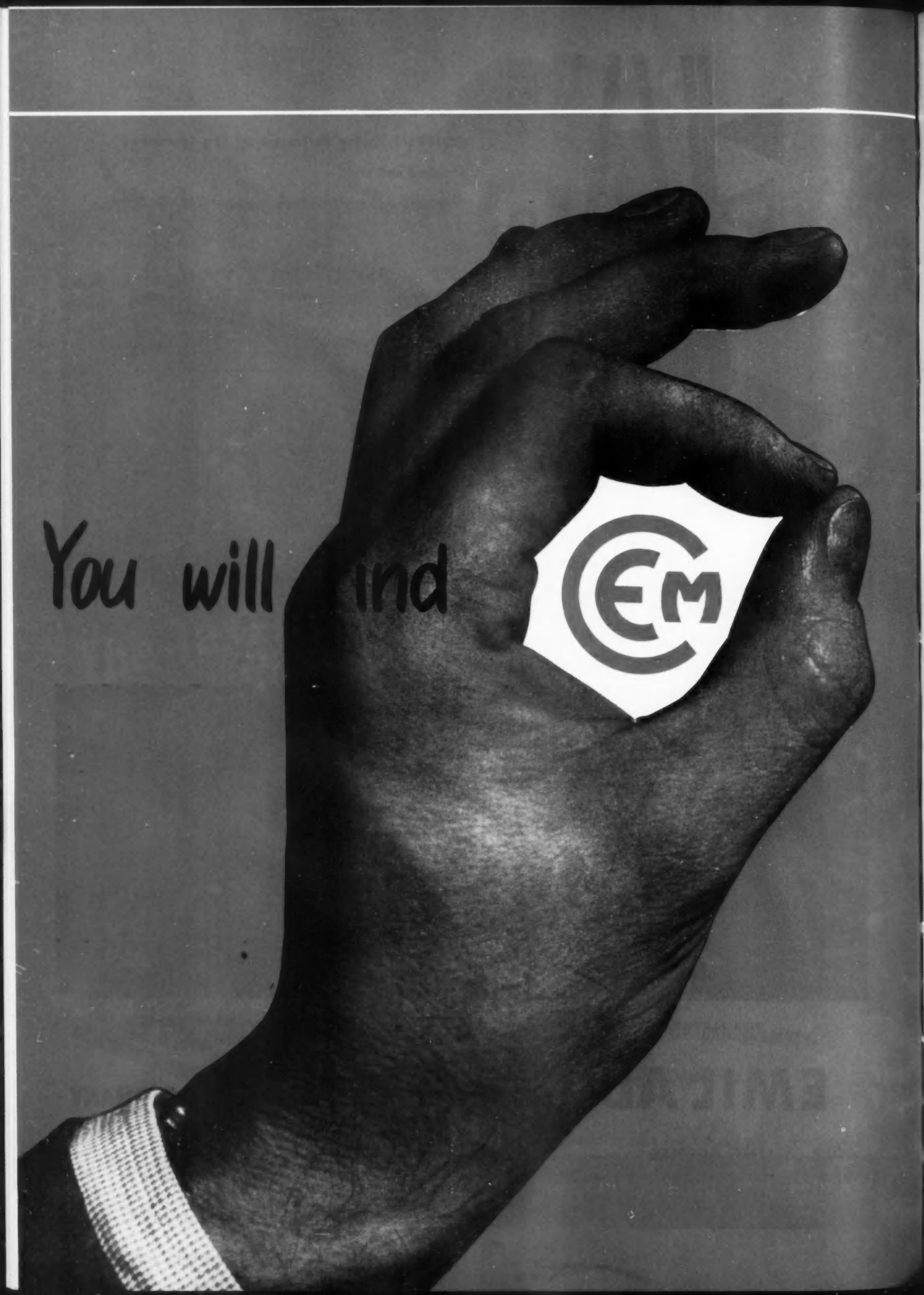
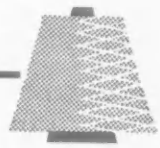

You will find



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yarns are 'just right'..

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HYDE Spinning Co., Hyde *Hyde* 80

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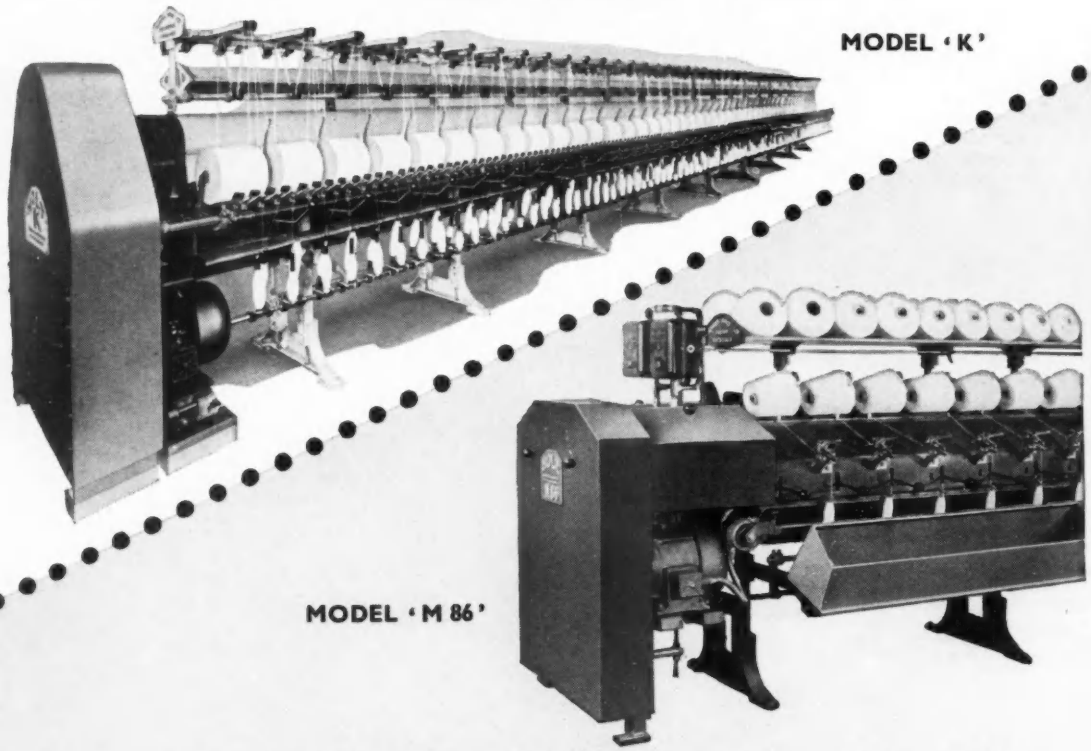

MODEL 'K'

MODEL 'M 86'

These two Holt machines embody those refinements in design which have made high speed, versatility and absolute uniformity outstanding characteristics of all Holt machines throughout a century of service to the Textile Industry the world over.

Illustrated above (left) is the Model " K " Cheese Winder which can be employed as a single or multiple end winder for the production of cheeses or cones, achieving perfect winding of packages up to 8" diameter at 5" and 6" traverse and up to 10" diameter at 8" traverse.

The Model " M 86 " High Speed Cone or Cheese Winder shown above (right) is outstanding in the consistency and uniform tension of the packages produced for Knitting and Warp Yarns. Silent in operation, the " M 86 " deals alike with all spun yarns in any count or quality. This adaptability is due to the independent reciprocating traverse motion from which a wide range of traverse to winding ratios is obtained without risk of pattern winding.

We shall gladly send illustrated leaflets fully describing these and other machines in the complete Holt range, and demonstrations may be arranged by appointment.

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HIGH SPEED PRECISION TEXTILE MACHINERY

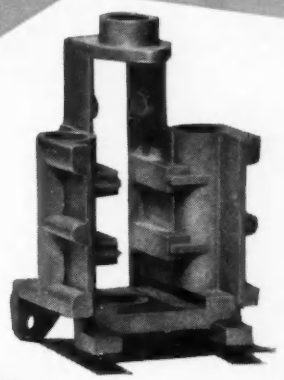
THOMAS HOLT LIMITED *Rochdale & Darwen*

dm HT 60

Quality castings in quantity

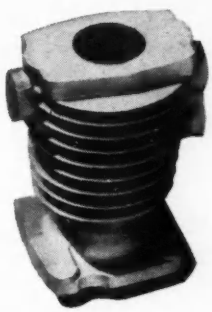
PRESSURE DIE CASTINGS

A large battery of Pressure Die Casting machines can supply quality castings for continuous supply in large quantities—on time. A wide range of alloys are available. This frame is supplied in Zinc-based Alloy BS.1004A.



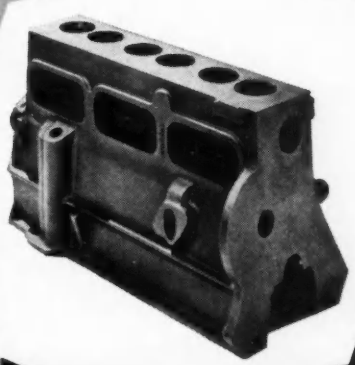
GRAVITY DIE CASTINGS

We have available a large Aluminium Gravity Die Casting Foundry where high quality precision castings are produced in a wide range of alloys. The cylinder shown is gravity die cast in LM.4 alloy.



MECHANISED & FLOOR CASTINGS

The Iron Foundries consist of five mechanised moulding units for castings up to 500 lbs. weight, maximum size 4 ft. x 3 ft. and a floor casting section handling up to 5 tons weight. Careful tests are made at all stages and castings can be balanced and locations machined to reduce machine shop time.
The Aluminium Foundries also include a large mechanised and a jobbing section.



We shall be pleased to help on your next casting problem.

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Suitable for Cotton, Worsted or Rayon Yarn
Applicable to any type of Winding Frame

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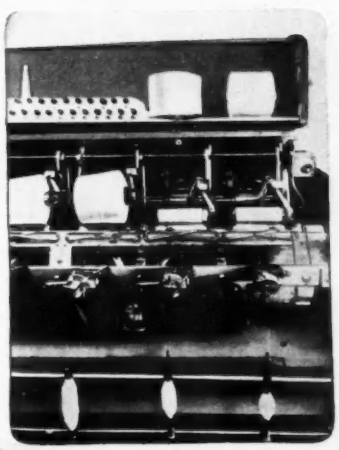
PRODUCES THE PERFECT INCREASED TAPER KNITTING PACKAGE

The "Arunconer" SOFT CHEESE and CONE WINDER



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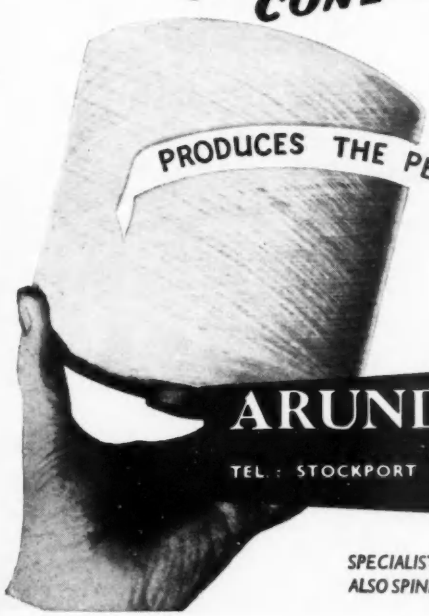

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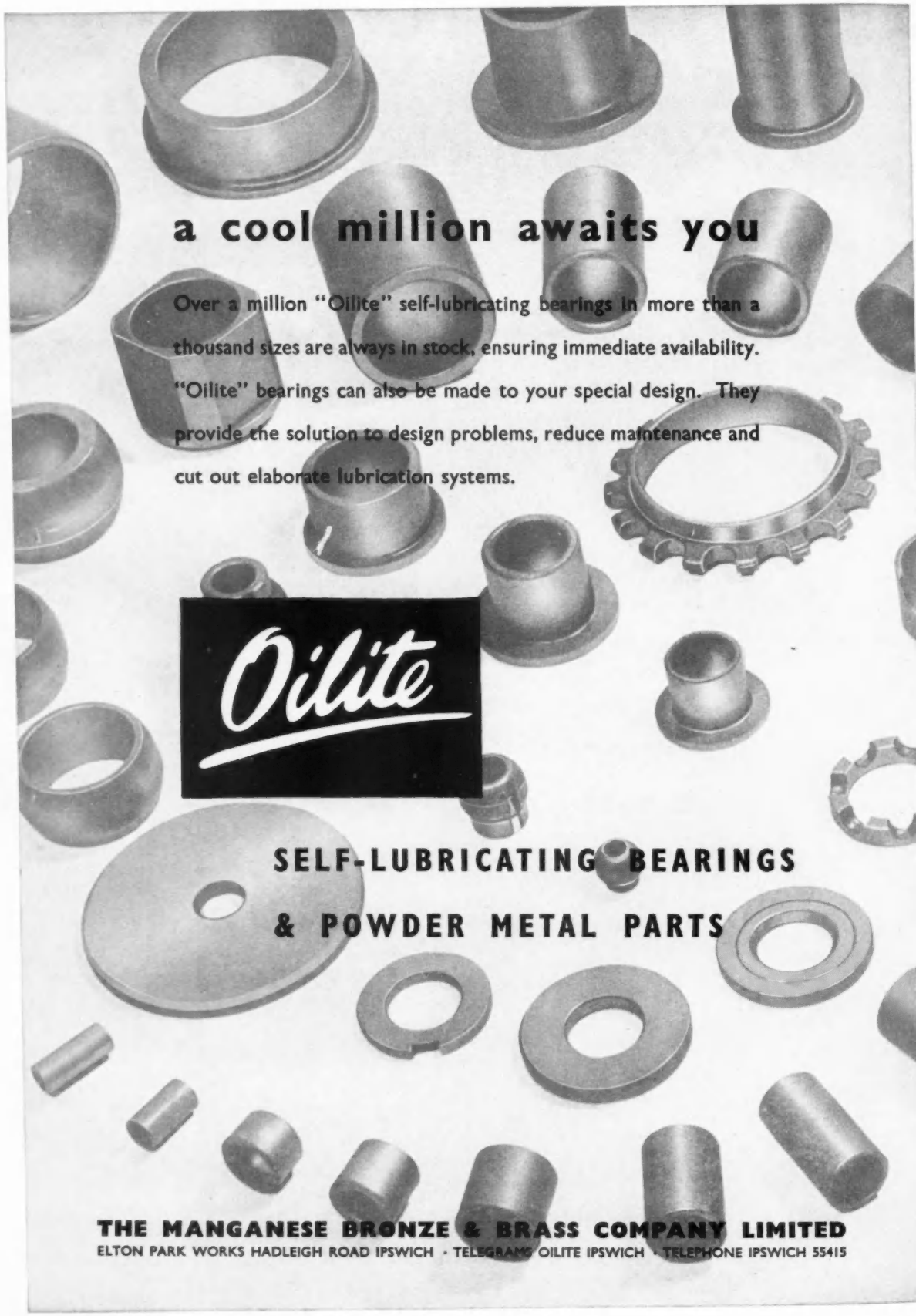
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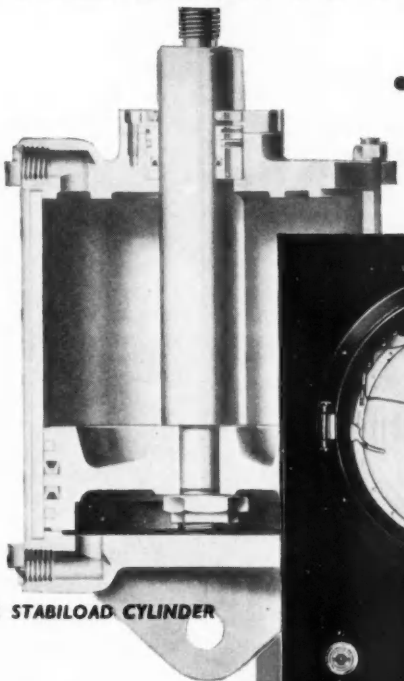
. . . for *padders, washers, mangles, squeeze rolls* etc



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THE REMOTE CONTROL PANEL

ADVANTAGES

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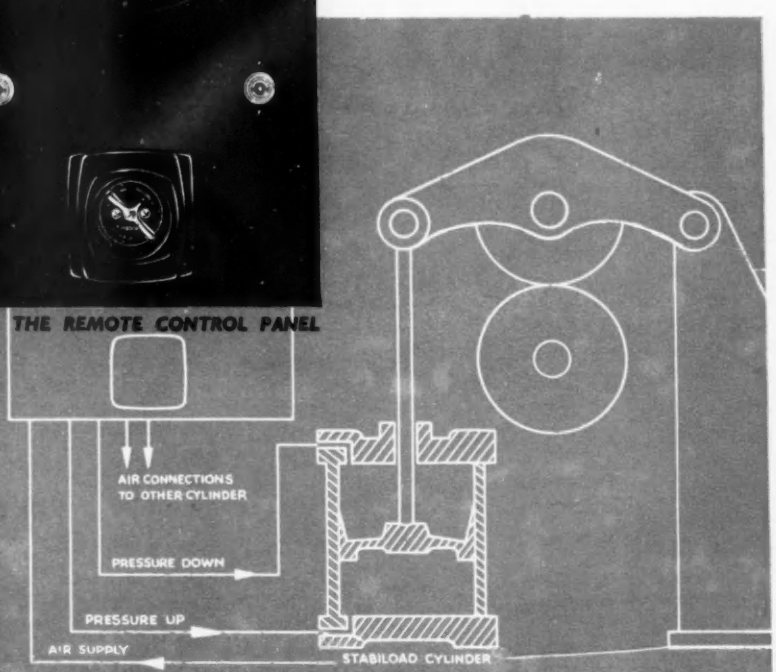

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Sir Richard Arkwright

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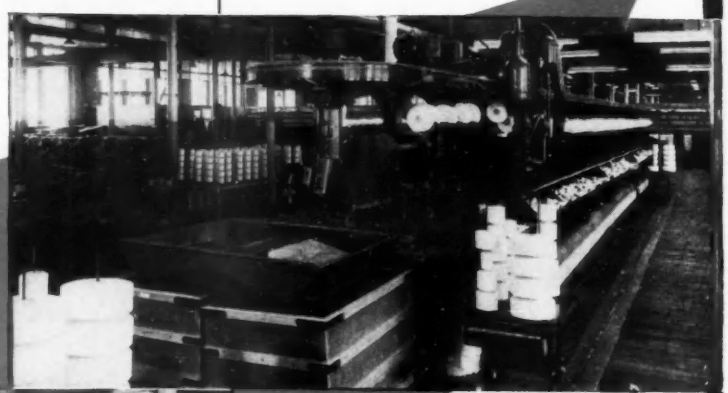
spinners, doublers

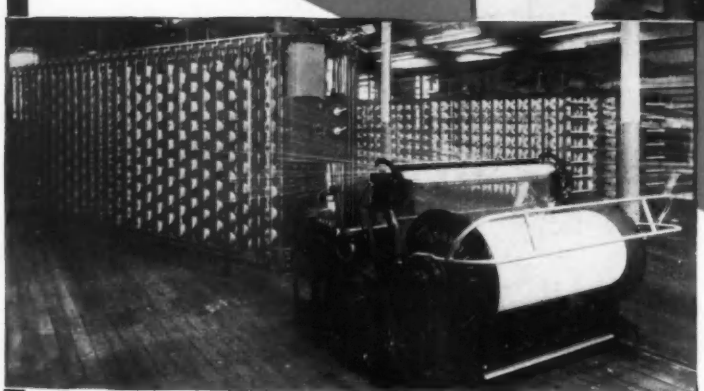
dyers and

processors of

cotton and

synthetic yarns





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speciality.

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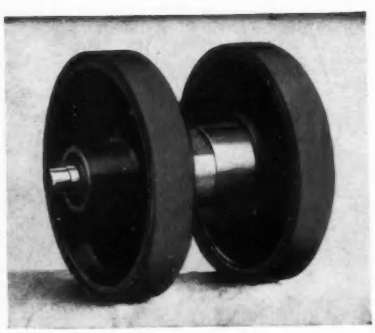
* *Photo shows a modern Jute Spinning Flat in a Dundee Mill, where TICO coverings have been installed.*

TICO

ROLLER COVERINGS



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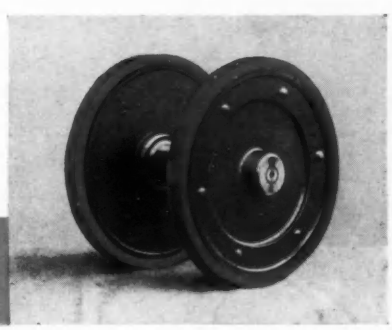
JUTE AND ALLIED FIBRE INDUSTRIES THROUGHOUT THE WORLD

- Considerably reducing laps.
- Reduction of pressing weight by up to 50%.
- Fewer end breakages and more uniform sliver produced.
- Long-Life covers.
- Unaffected by high humidities.
- Resilient.
- Completely oil resistant.
- Precision grinding by experts.

Tico Specialities include covers for circular loom pusher-pulleys, wet spinning rollers for the Flax Industry ; Rubber Buffers for Looms, and coverings for Loom Cloth Rollers etc.



Agents for the Flax, Jute and Allied Industries

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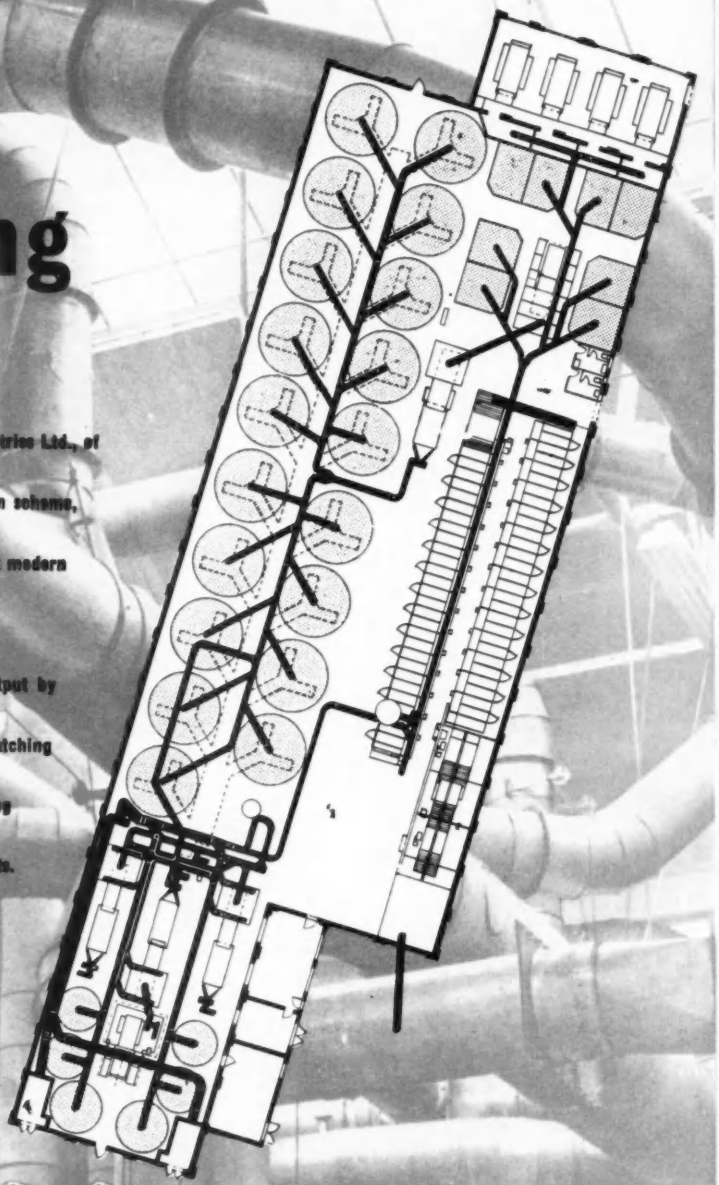
blending plant

was supplied to Messrs. Petmar Industries Ltd., of Batley for their £1 million expansion scheme, making it one of the largest and most modern fibre and carpet plants in Europe.

This new plant greatly increases output by simplifying standardisation and the matching of colour and quality whilst effecting considerable savings in production costs.



SPENSTEAD

the complete system was designed, constructed and installed by

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BRIDGE WORKS OSSETT YORKSHIRE

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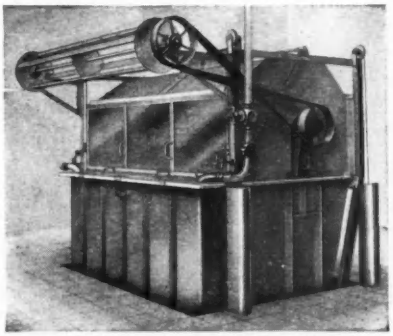
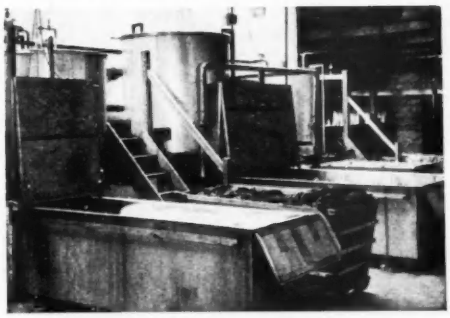
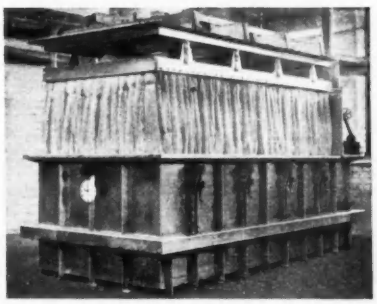


Above—Enclosed Piece Dyeing Machines

Above—Loose Wool Dyeing Plant



Above—Top Dyeing Machines



Hank Dyeing Machines for Carpet and Hand Knitting Yarns

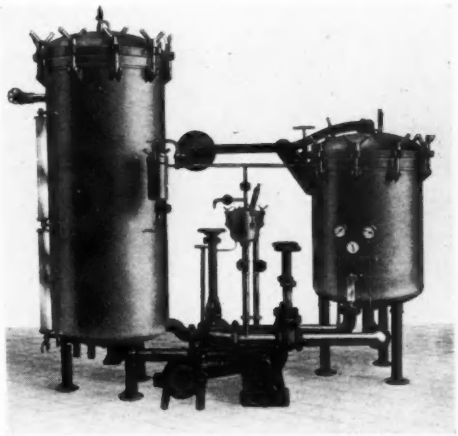
LONGCLOSE DYEING PLANT for the WOOLLEN and WORSTED TRADES

Whatever fibres, natural or synthetic are used in the production of woollen and worsted yarns and fabrics, there is a Longclose machine to dye them.

There is a suitable Longclose Plant to dye these fibres at every stage from raw stock to finished goods.

Longclose all Stainless Steel Plant is used throughout the world for dyeing loose material, slubbing, yarns, piece goods and knitted fabrics.

Write for details of the types illustrated, or if you have special requirements, let us place our wide experience at your service.



Pressure Dyeing Plant for all Temperatures up to 130° C. for yarns in cheese and cone, and for dyeing synthetics

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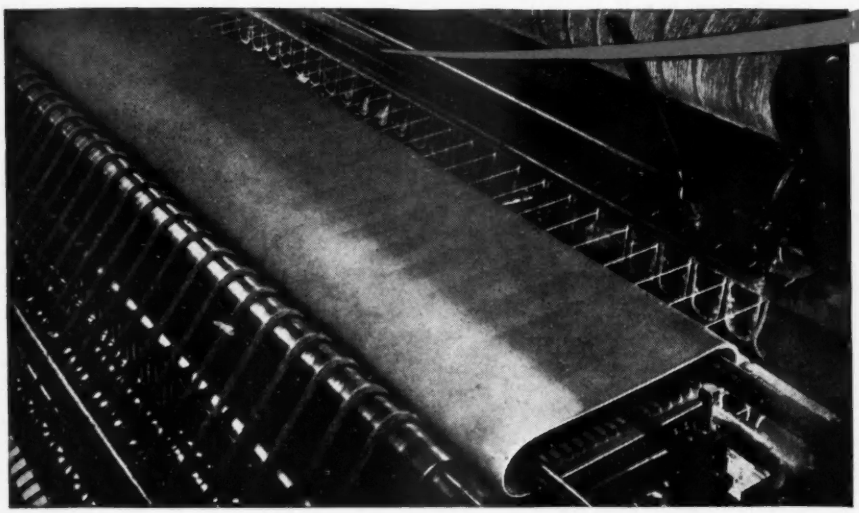

Andre Condenser Rubbers in a well-known Yorkshire mill. In use for more than 5 years, the rubbers are still working with unimpaired efficiency. Leading manufacturers throughout the world are obtaining similar service from Andre Rubbers.

Working on an extremely wide variety of blends, Andre rubbers are giving years of trouble-free service, while putting up to 50% more material on to the condenser bobbins . . . and that means fewer creeling operations on the mule. Producing round, dense, uniform slubbing at greatly reduced eccentric speed, Andre rubbers reduce condenser wear and power consumption . . . If you are not using Andre rubbers you are not getting the best from your machinery. Complete range of sizes for every Condenser.

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- **HIGHER PRODUCTION**
- **MORE UNIFORM & STRONGER YARN**
- **LESS MAINTENANCE**

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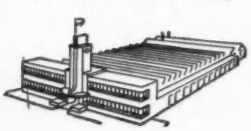
Three and a half acres of Specialised Rubber Technology



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Rag Pickers Mink

An interesting feature of this patented rag machine is the 24" Swift giving the machine a greatly increased output over existing machines • Hoffmann self-aligning bearings are equal to more arduous loading and promote smooth and trouble-free running, being fitted on the Swift shaft, the bitter fan shaft and the back fan shaft • The bearings are dependable and durable and result in exceptional saving in power and maintenance costs.

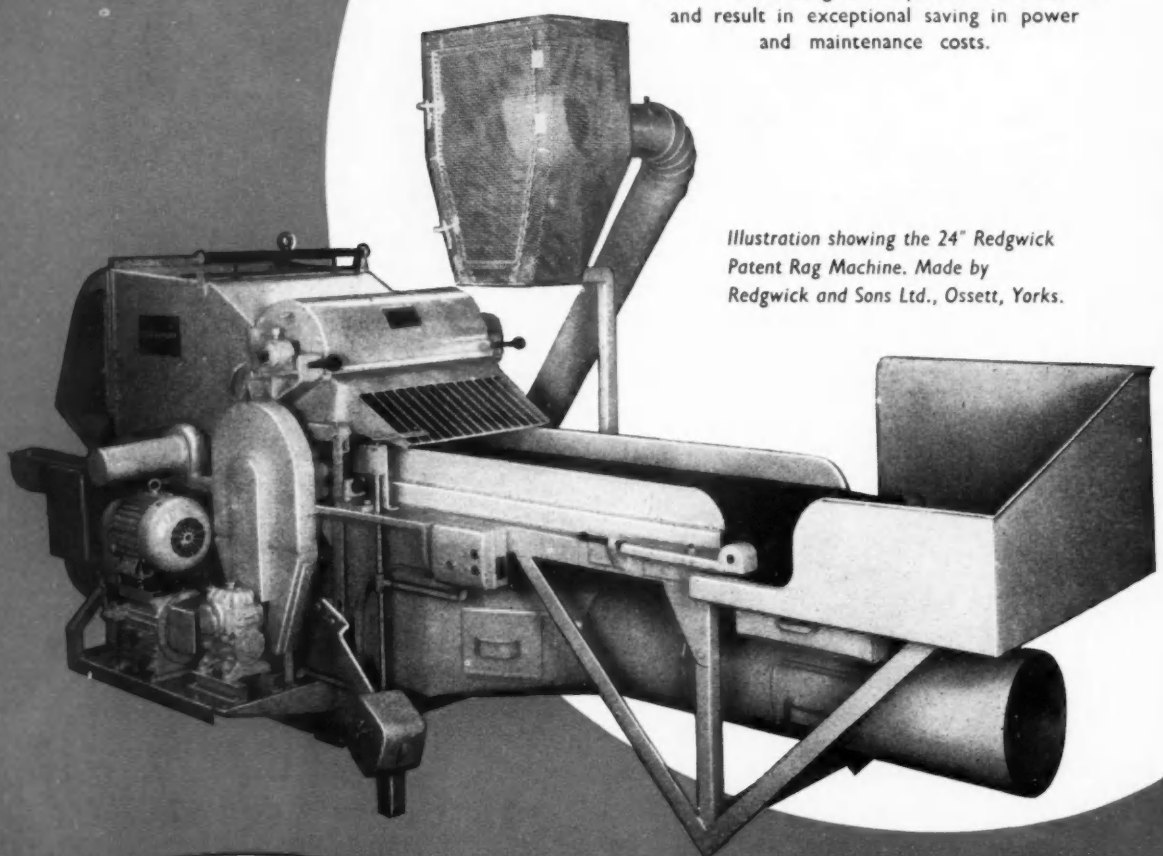
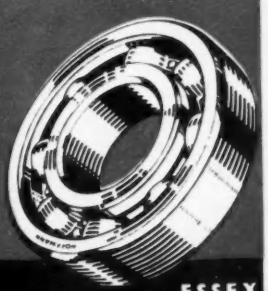


Illustration showing the 24" Redgwick Patent Rag Machine. Made by Redgwick and Sons Ltd., Ossett, Yorks.

HOFFMANN

BALL AND ROLLER BEARINGS



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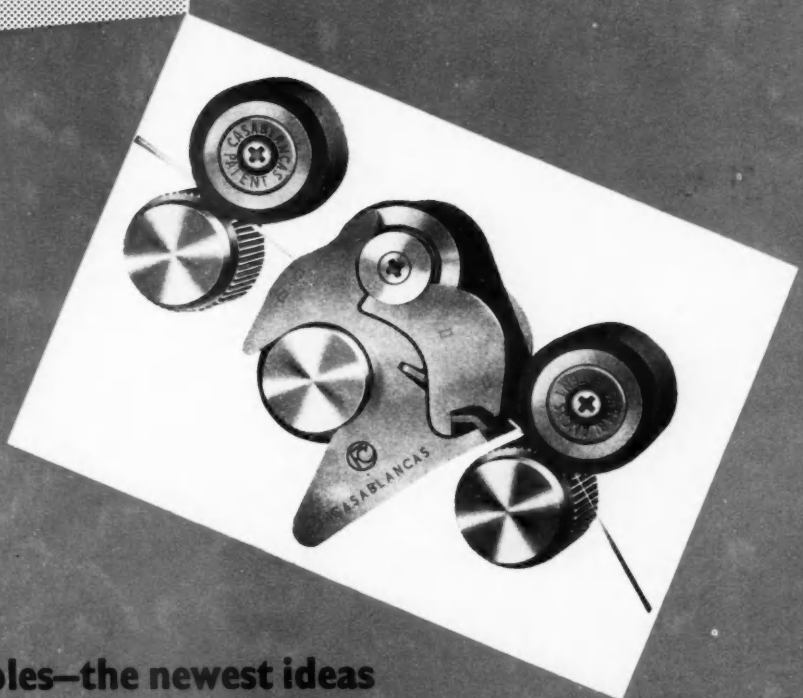

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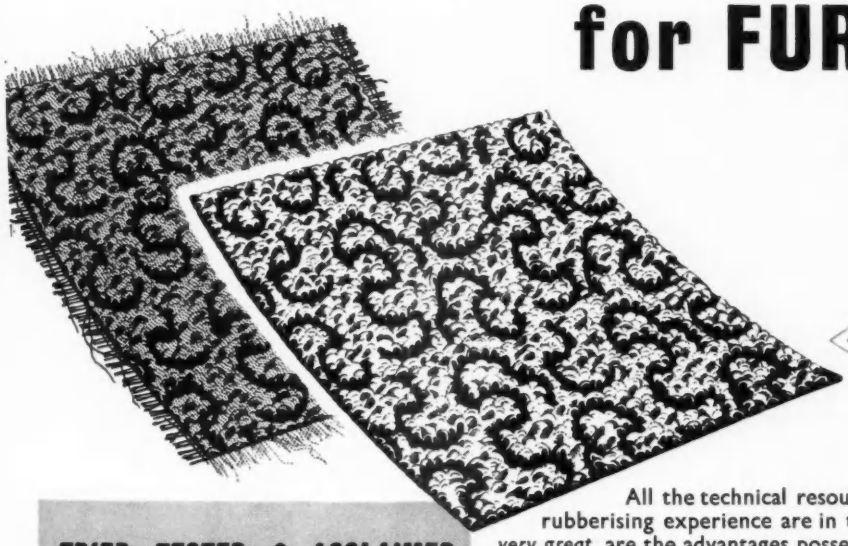

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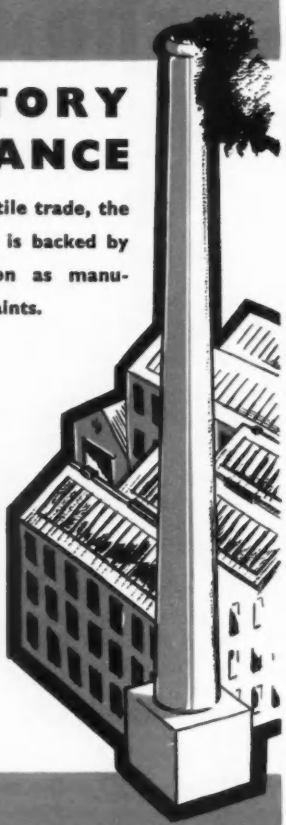

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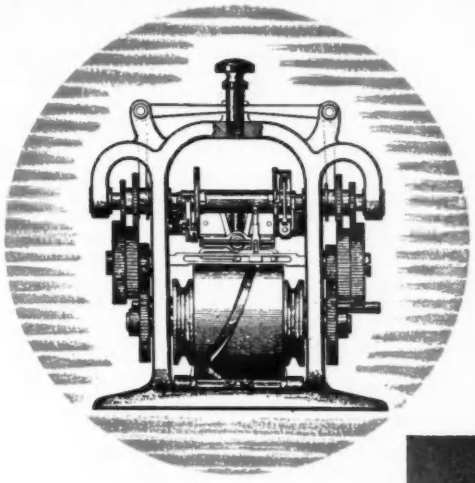

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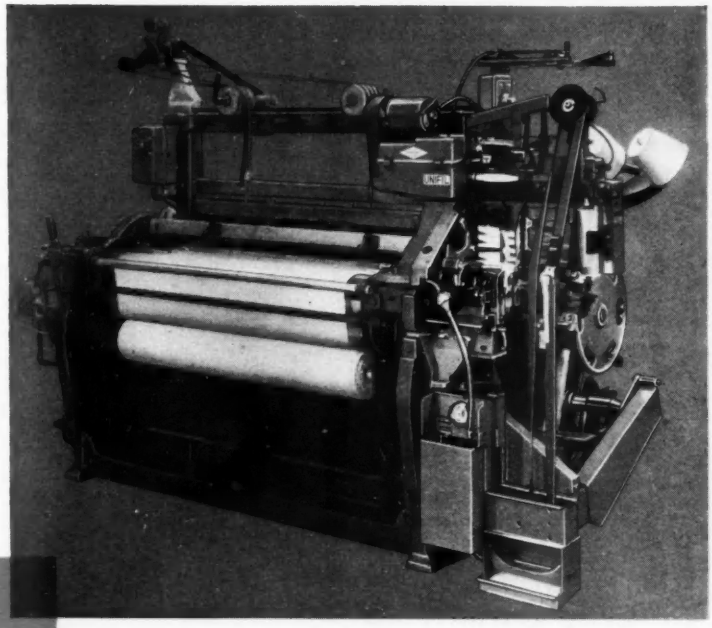

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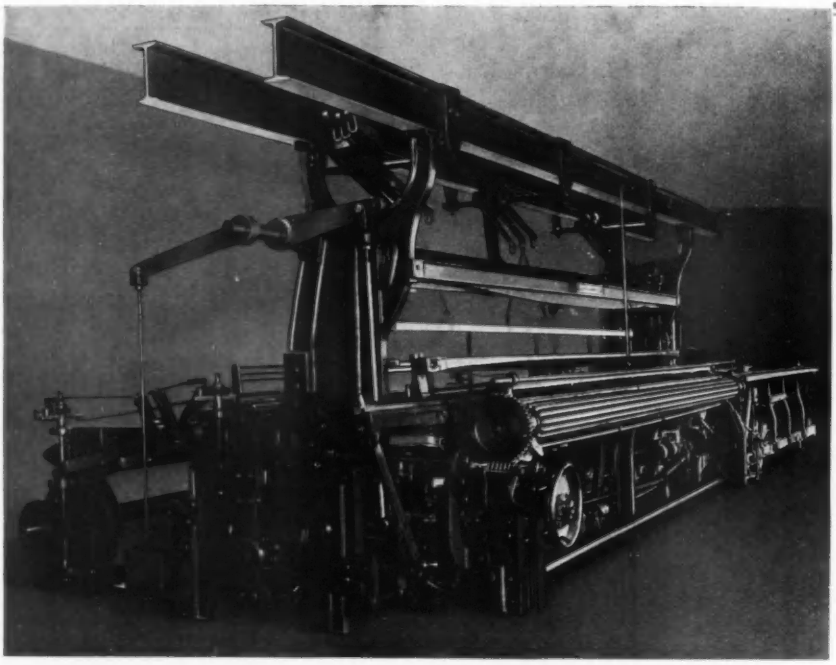

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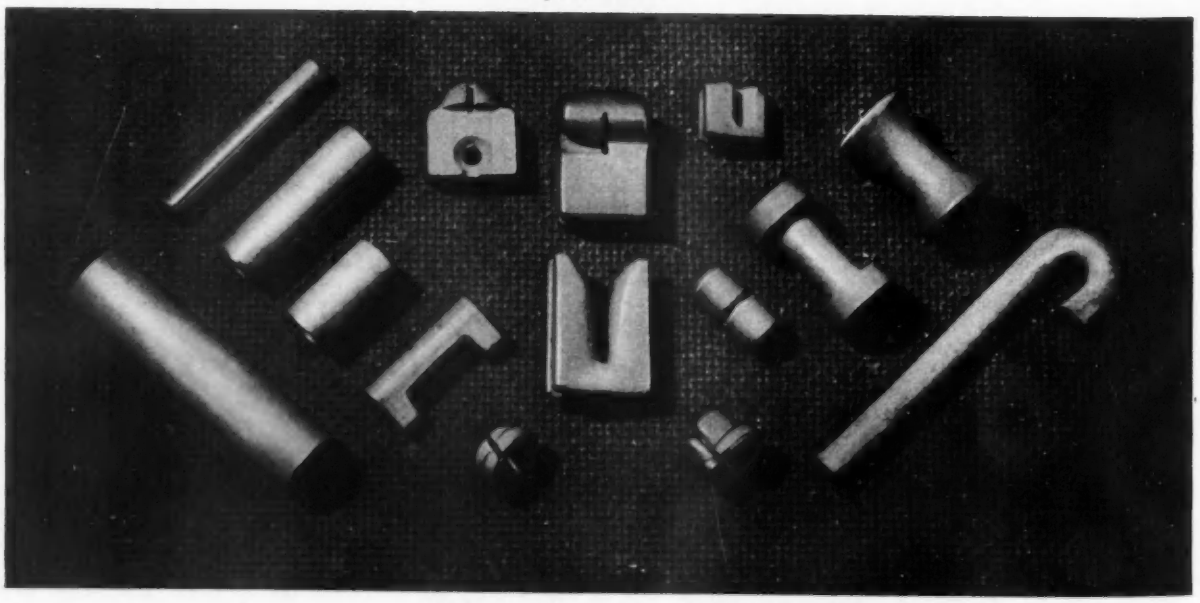

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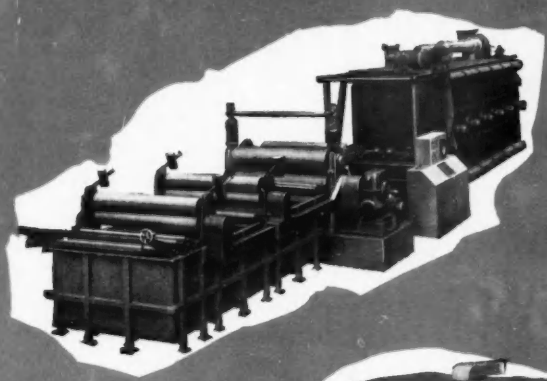

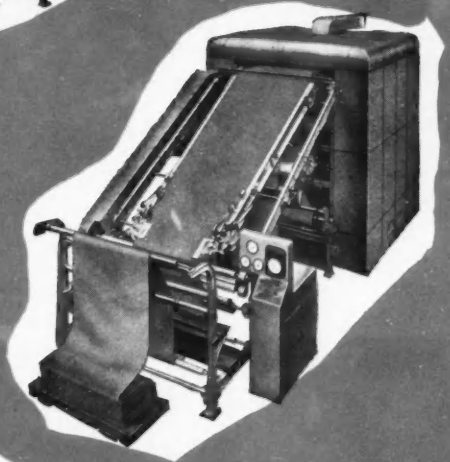

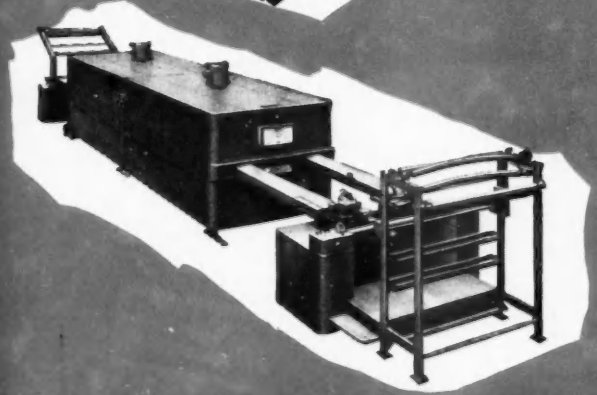

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The bottom illustration shows one of the more recent additions to the E.G.W. range— the famous E.G.W.-Vits Universal Stenter, now manufactured under licence at Beech Works. This phenomenal machine incorporates the Vits World Record Drying System for the quick drying, shrinking or setting of fabrics, or for polymerising and processing of resin finishes.

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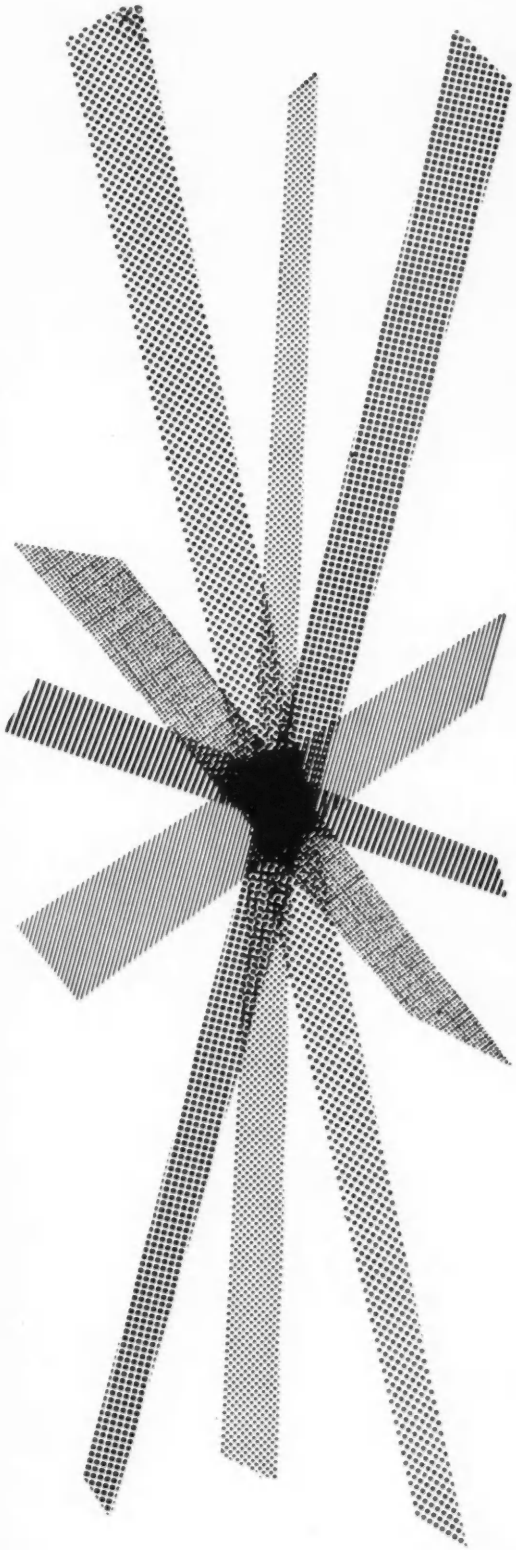

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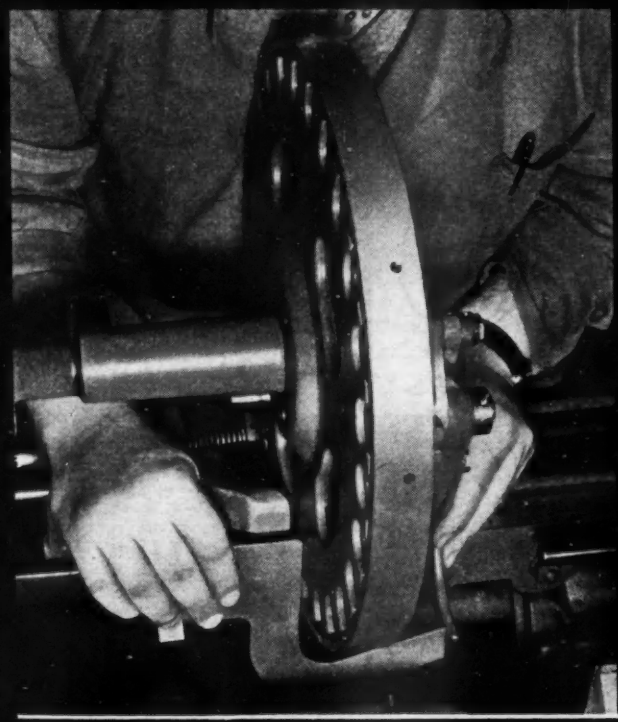

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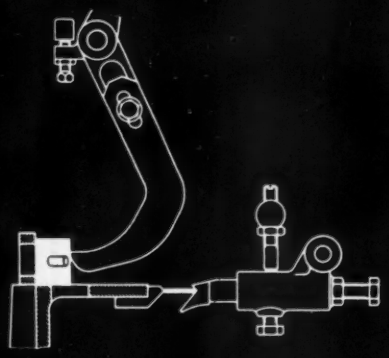

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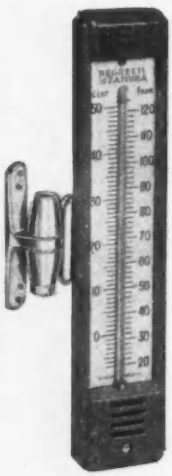

Room Thermometer
with plastic case

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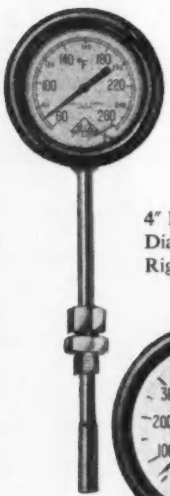

4" Mercury-in-steel
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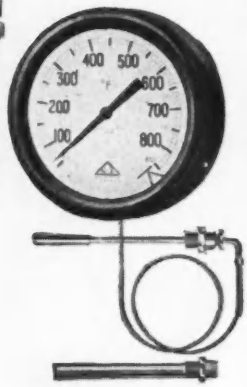
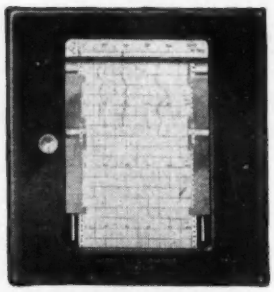
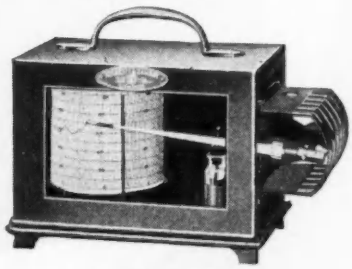


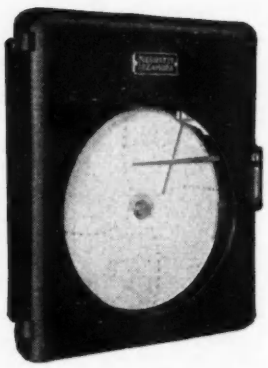
Distance-type Mercury-in-
steel Dial Thermometer



Resistance Thermometer
Recorder



Bi-metallic Recording
Thermometer



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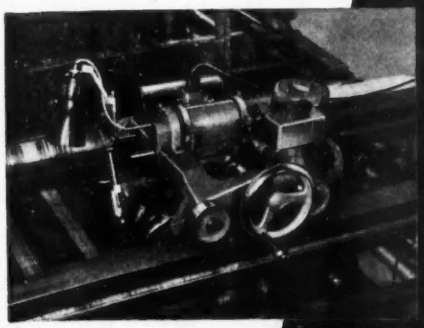

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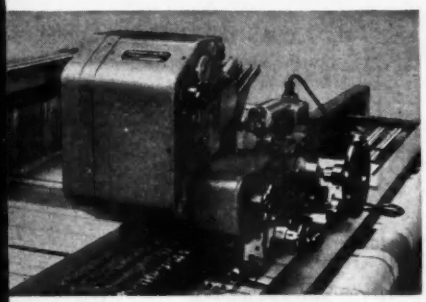

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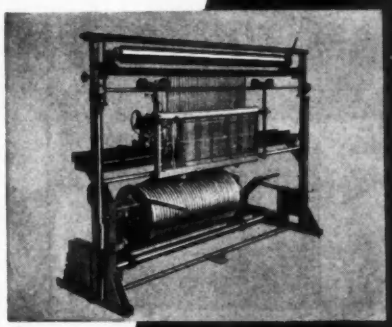

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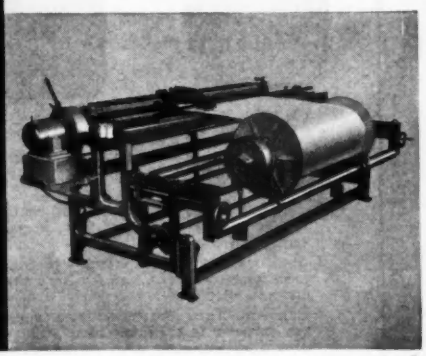

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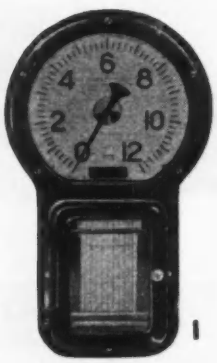

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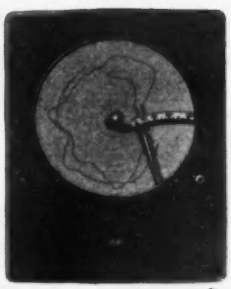

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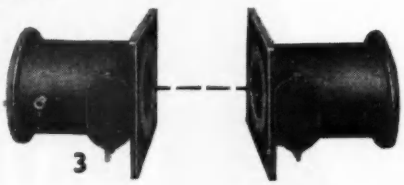

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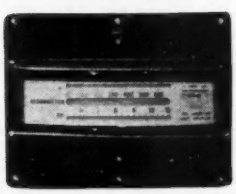

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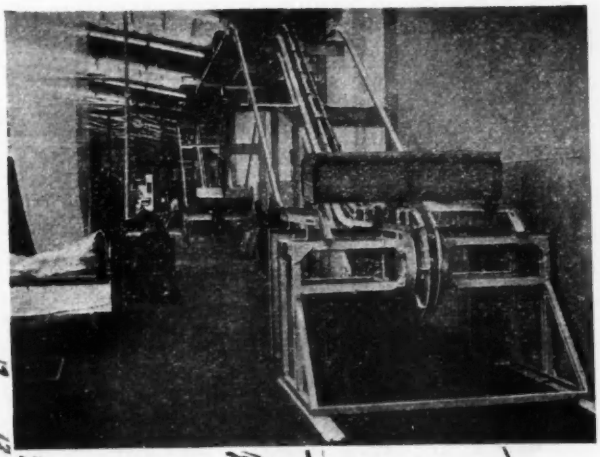

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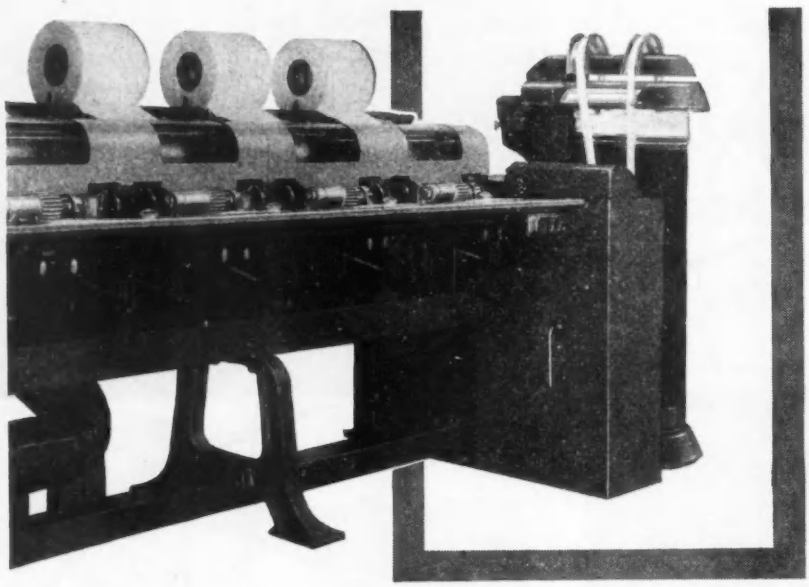

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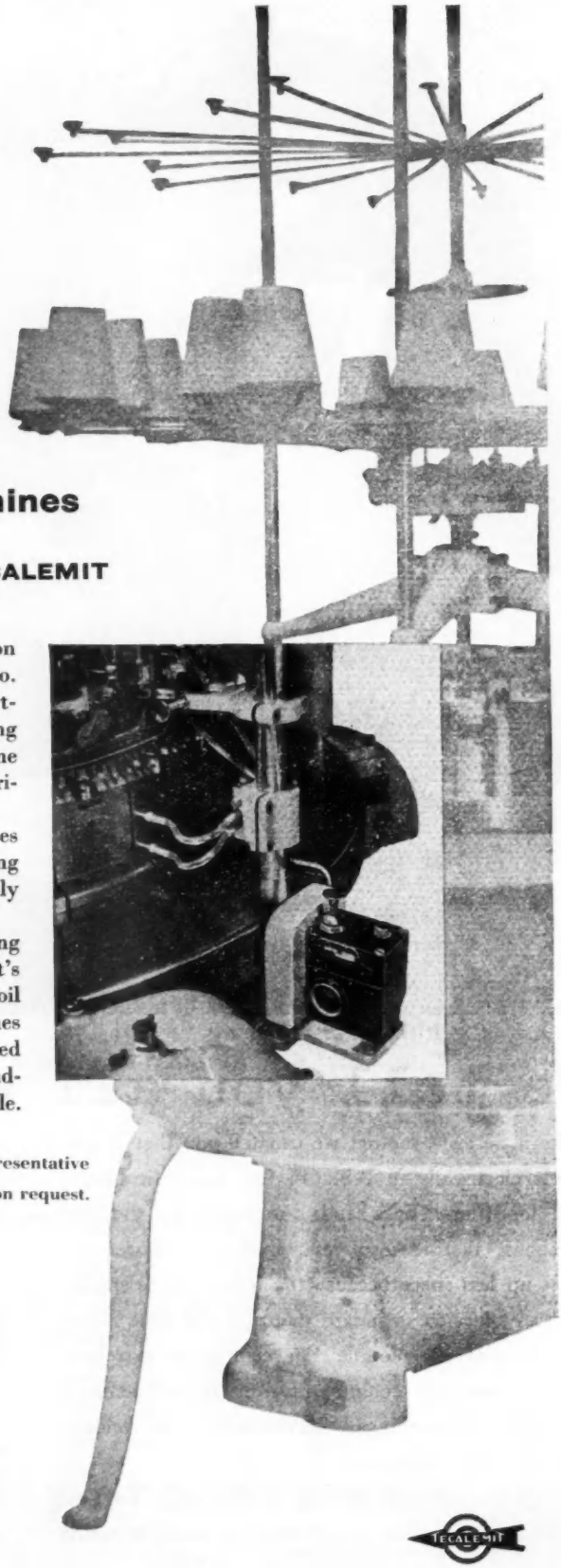

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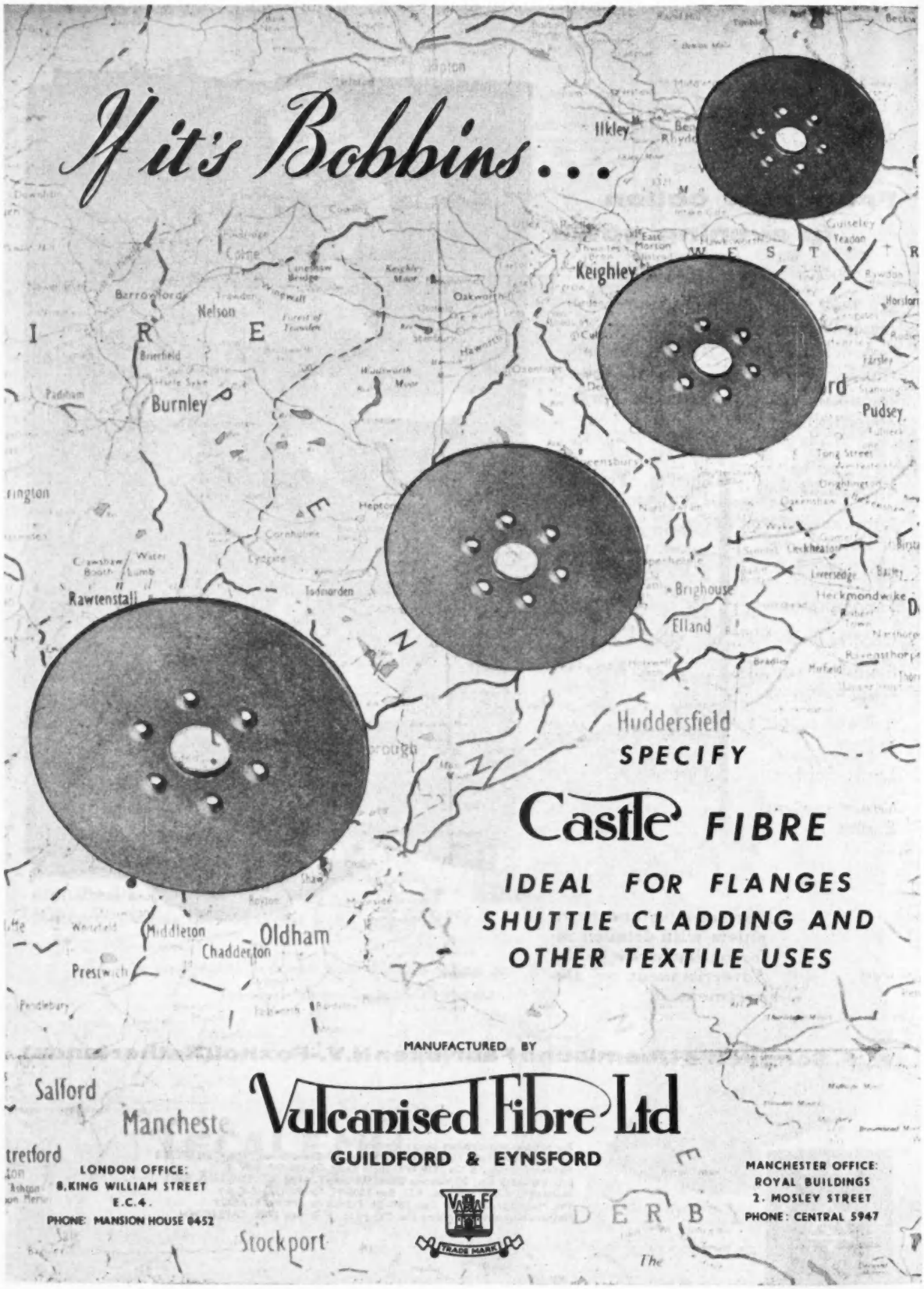

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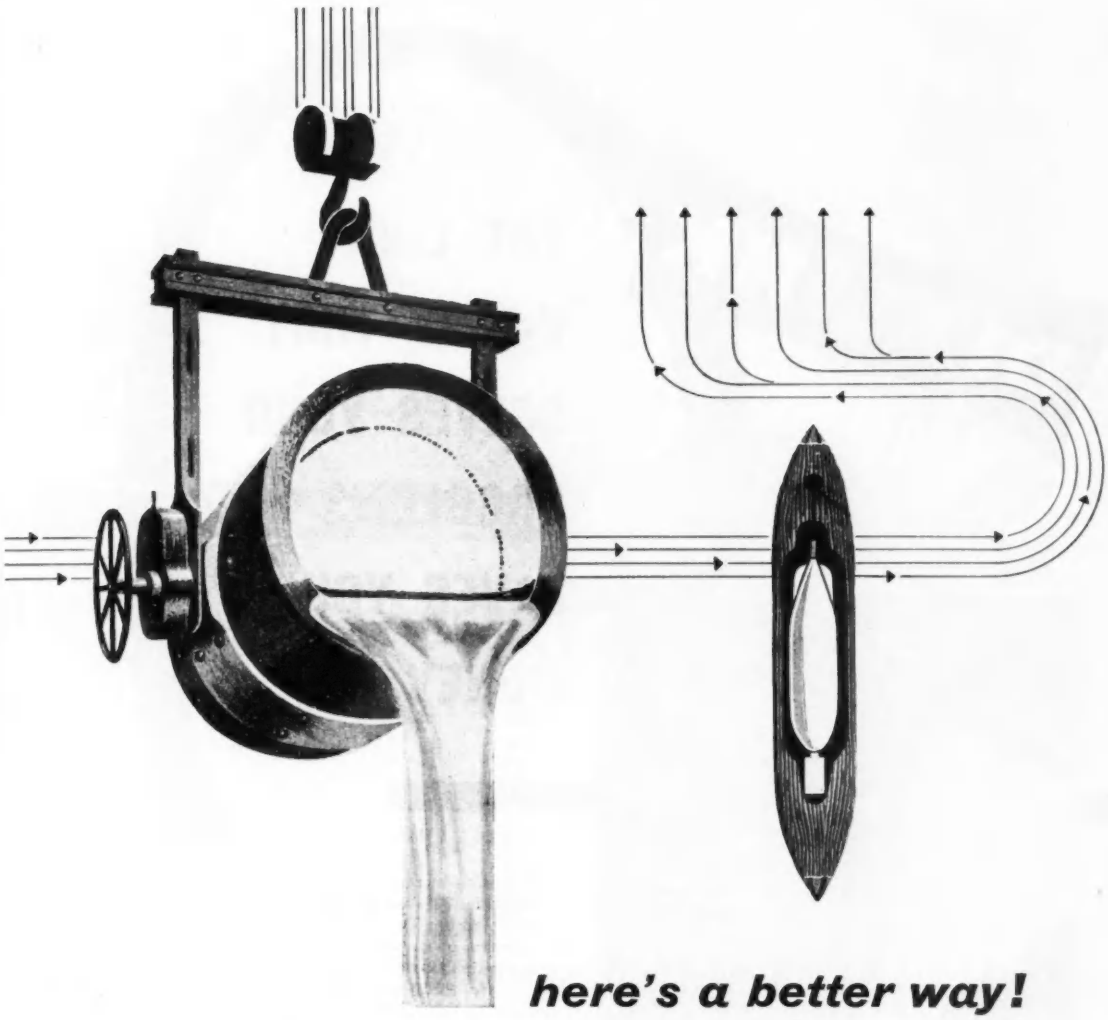

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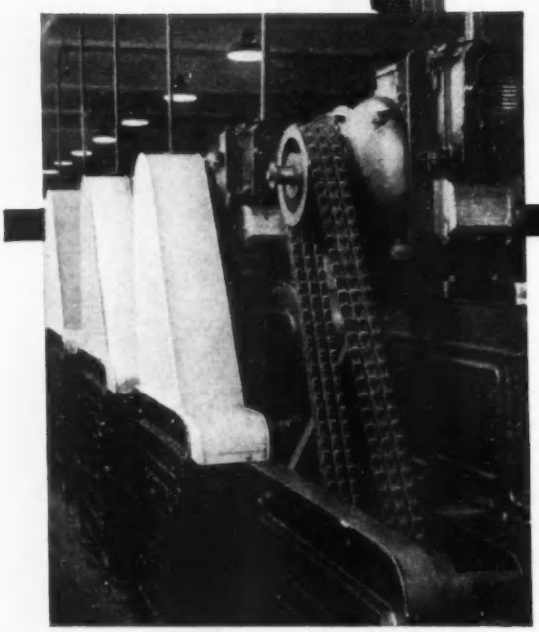

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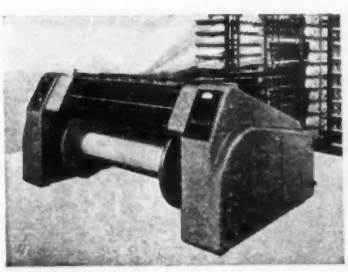

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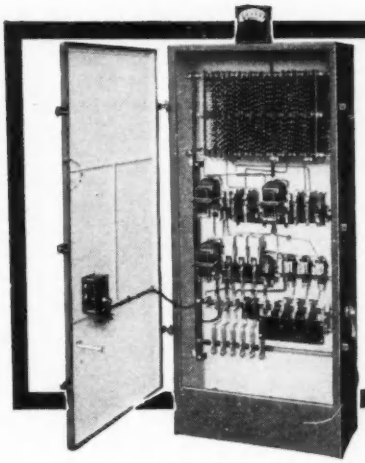

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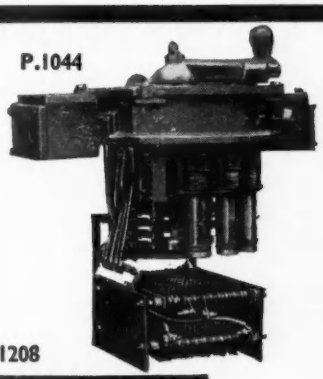

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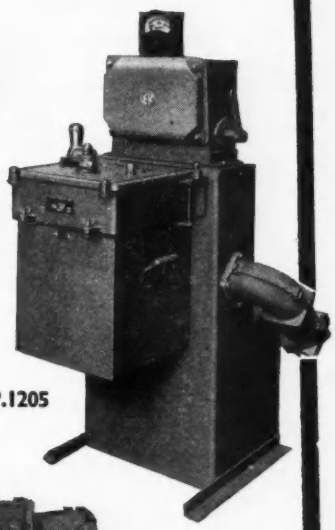

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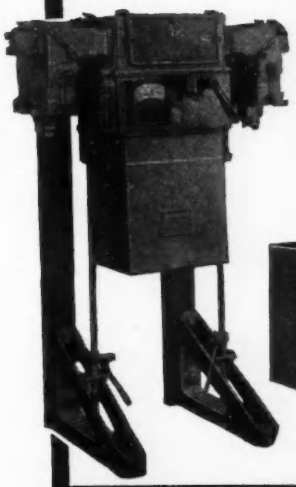

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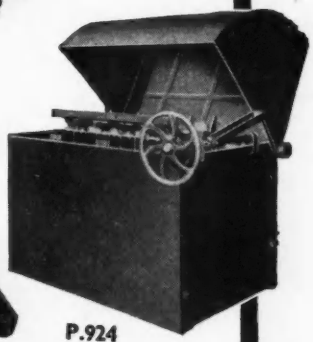

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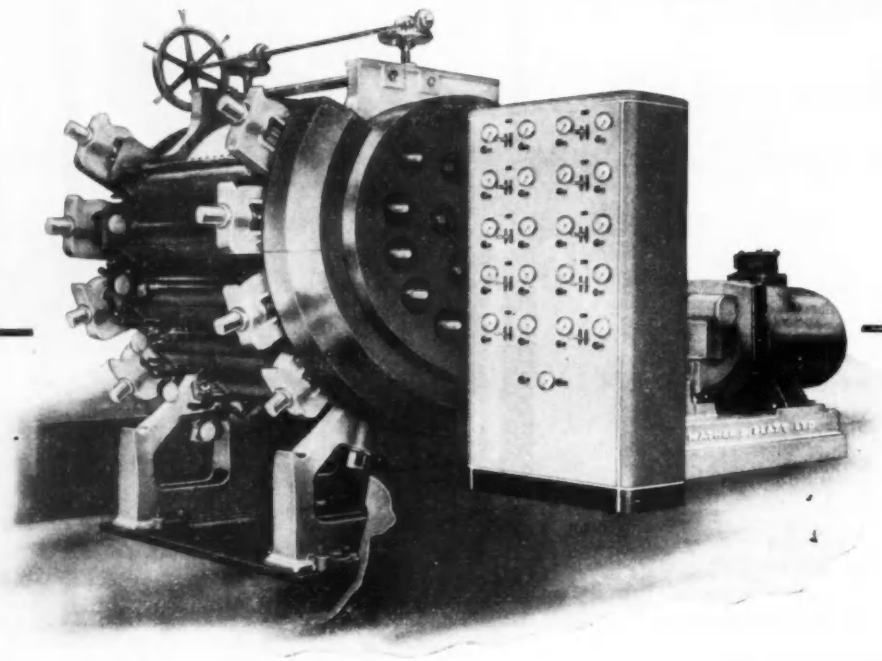

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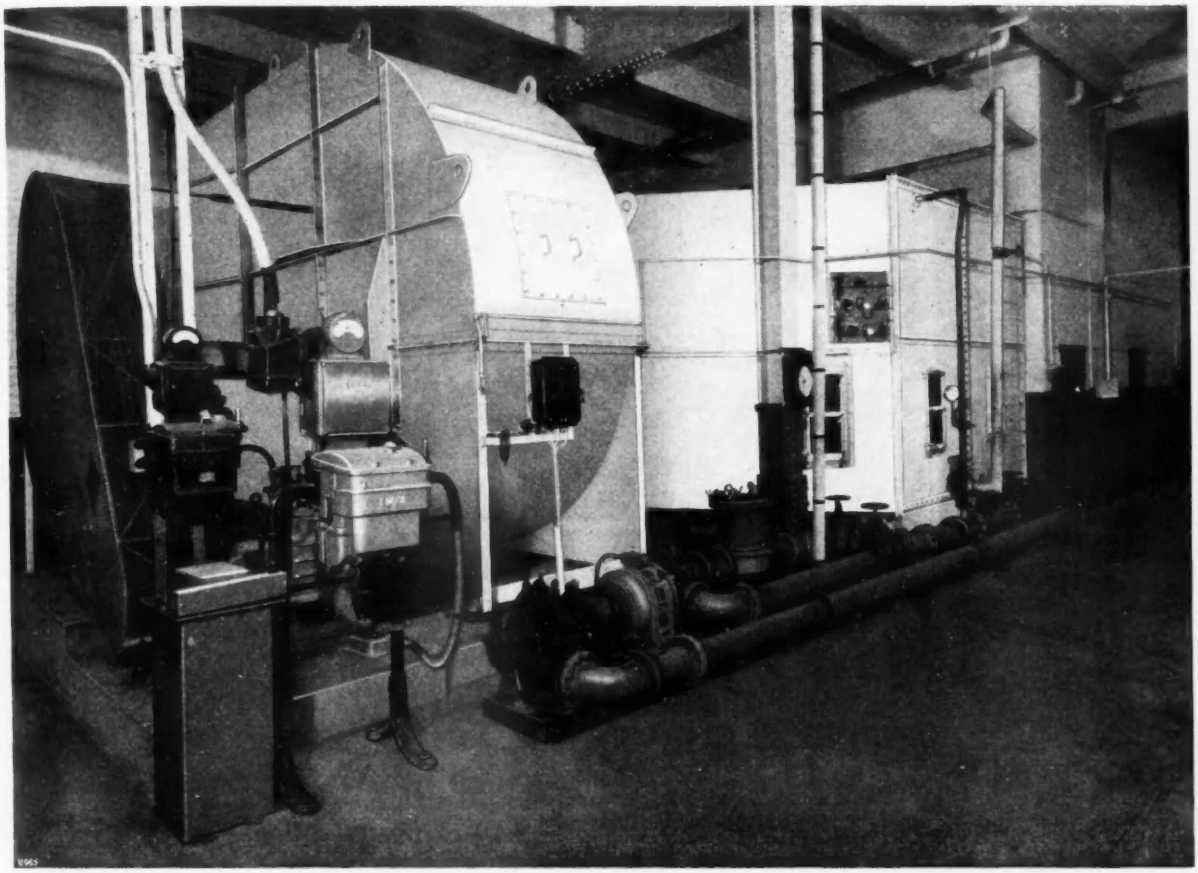

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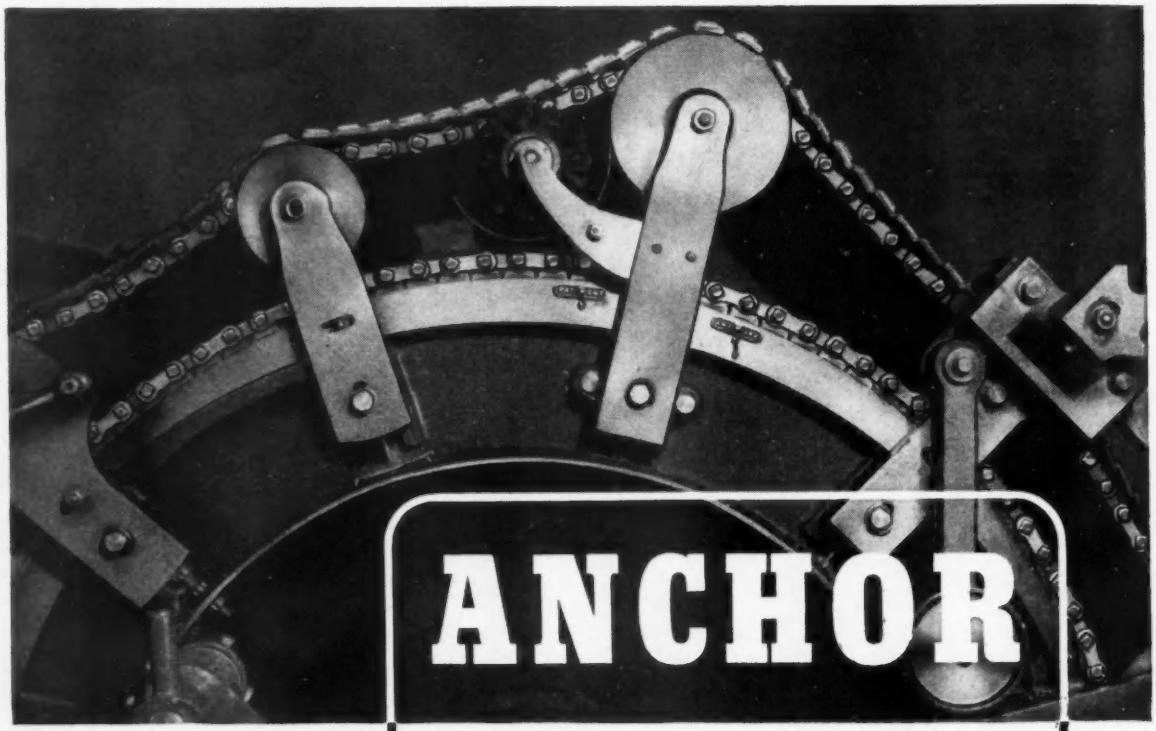

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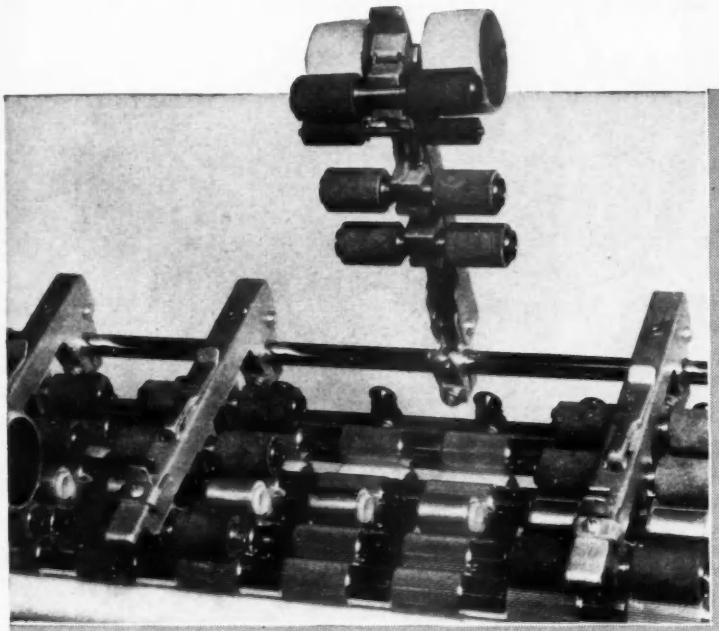

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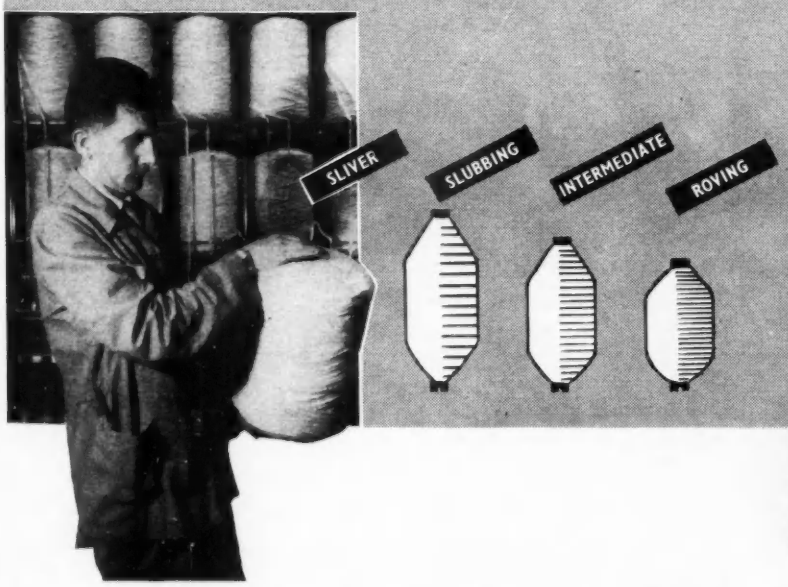

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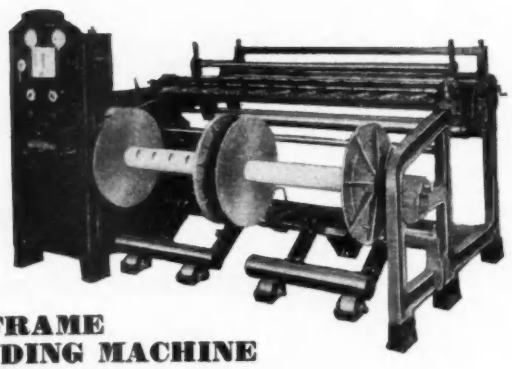

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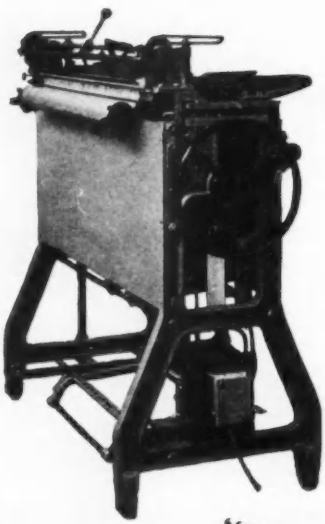

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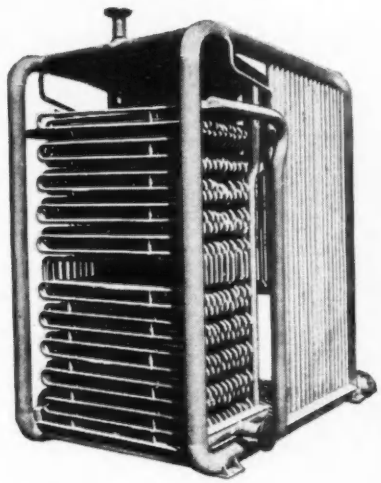

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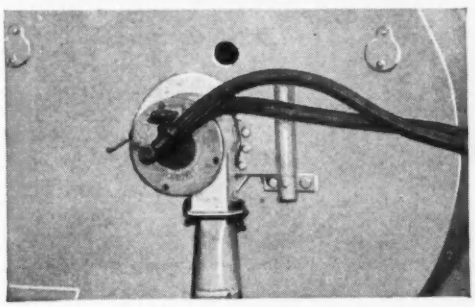

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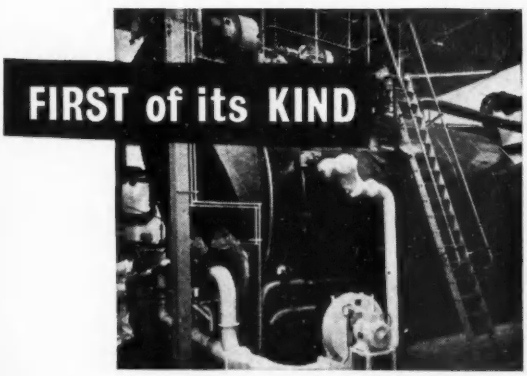

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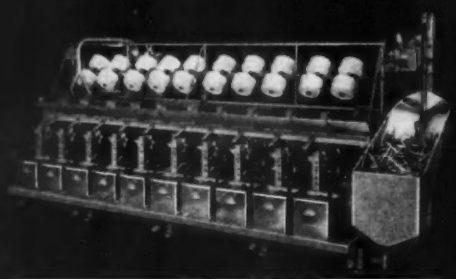

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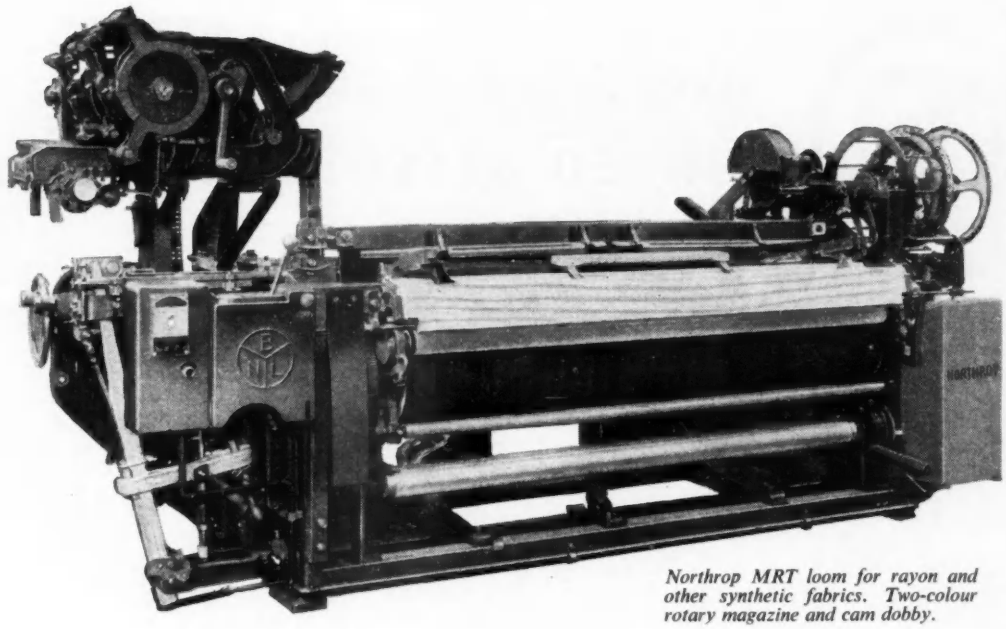

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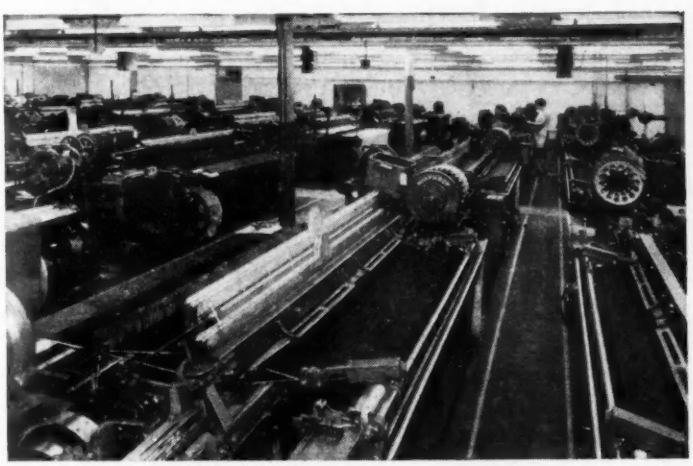

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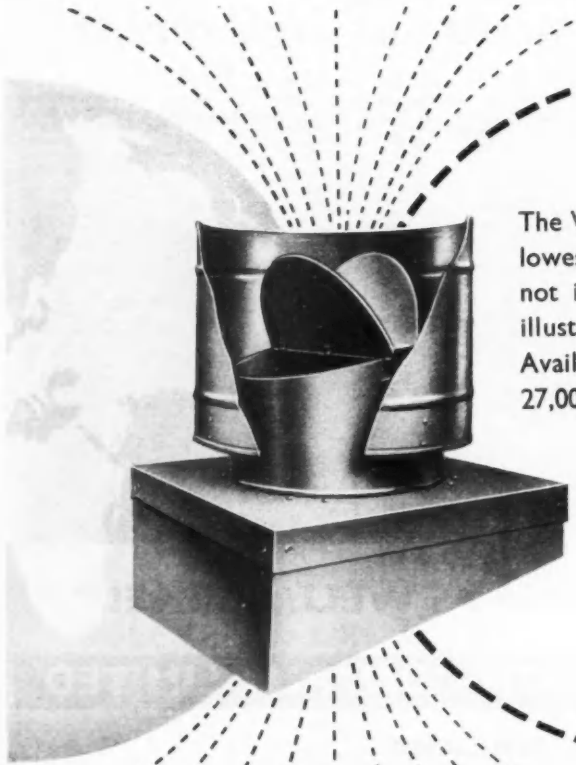

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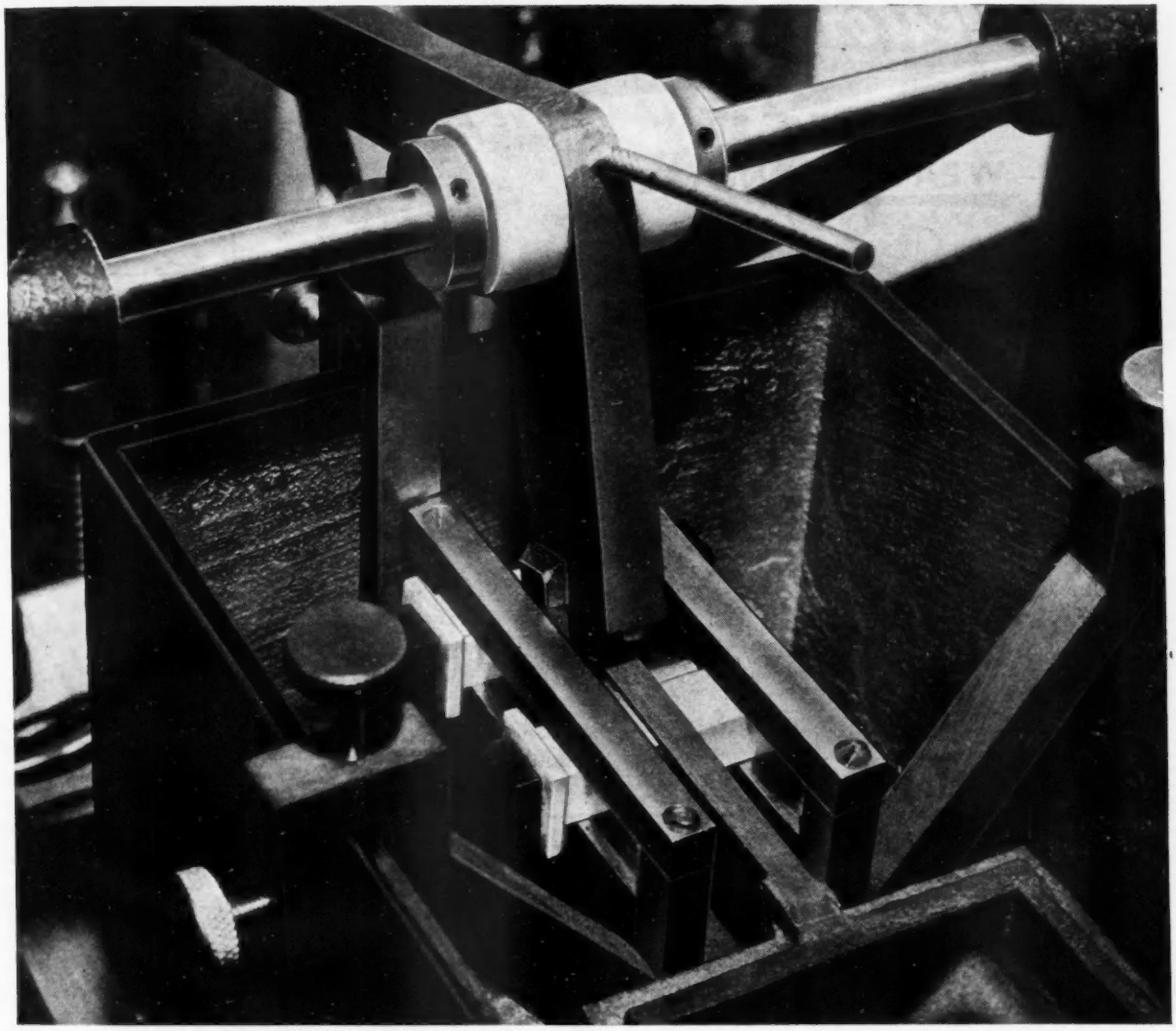

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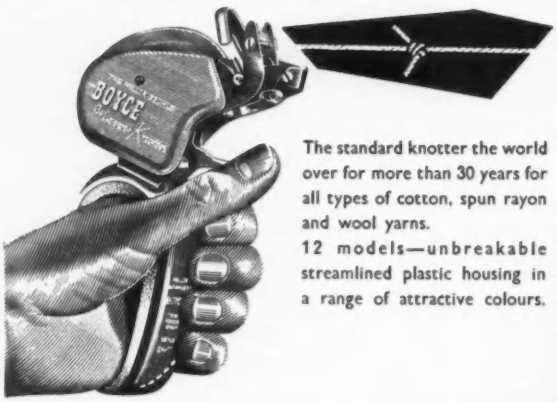

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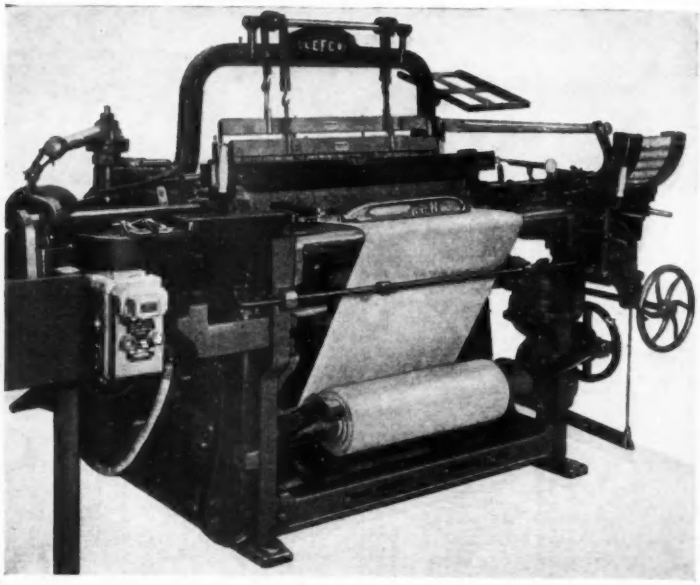

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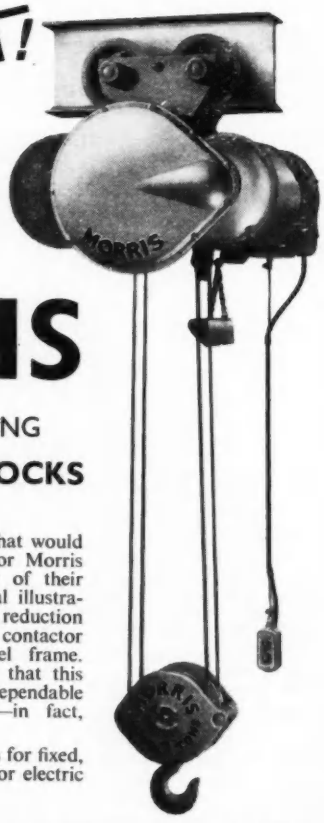

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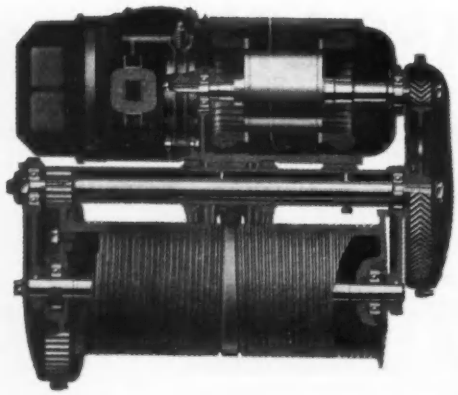

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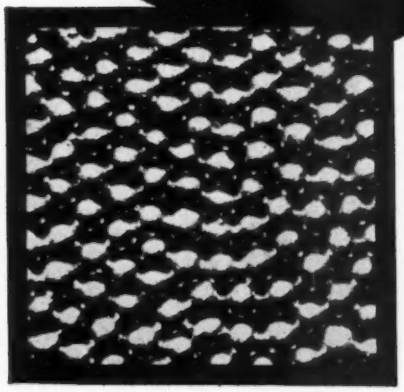

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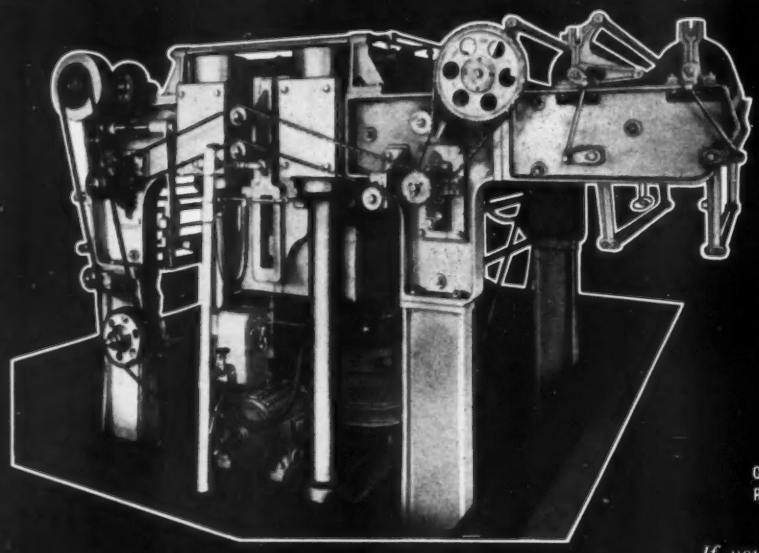

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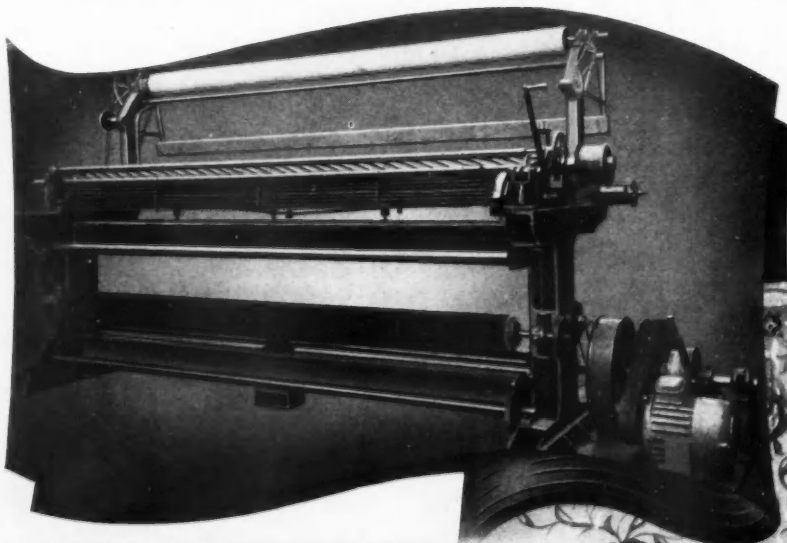

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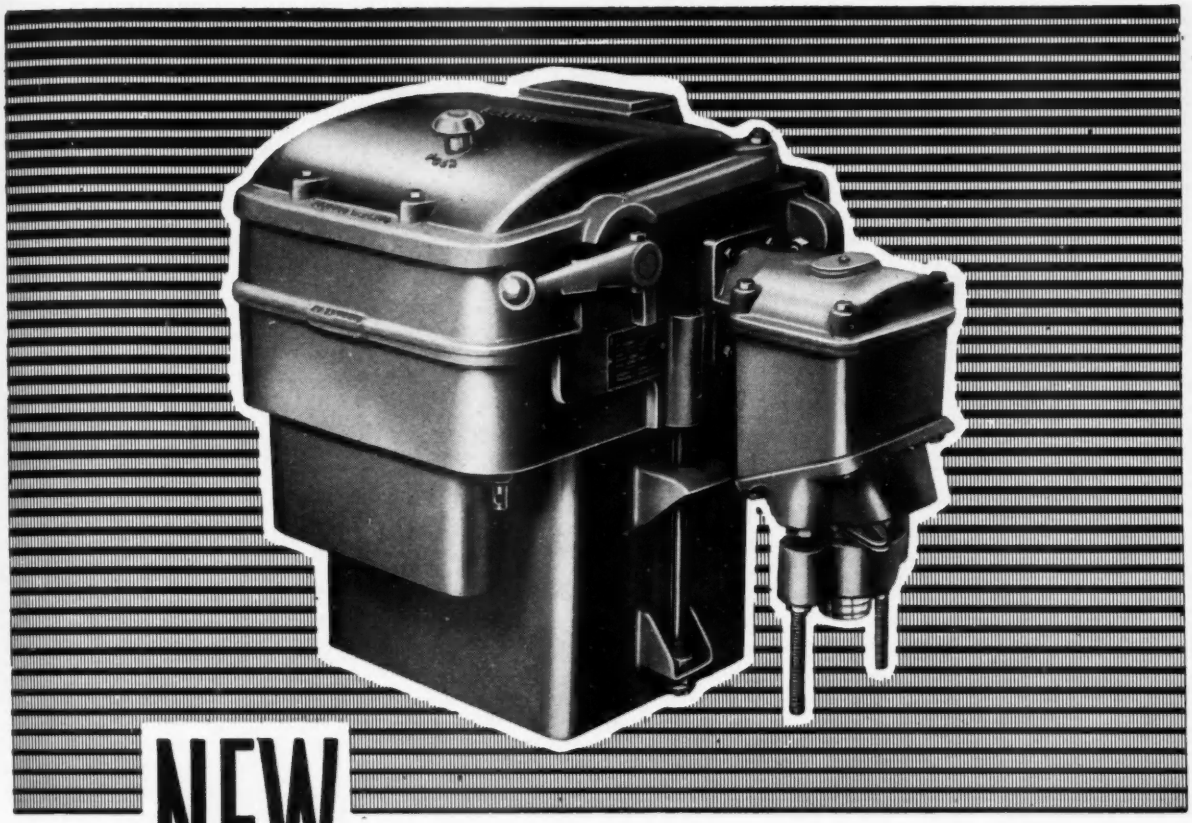

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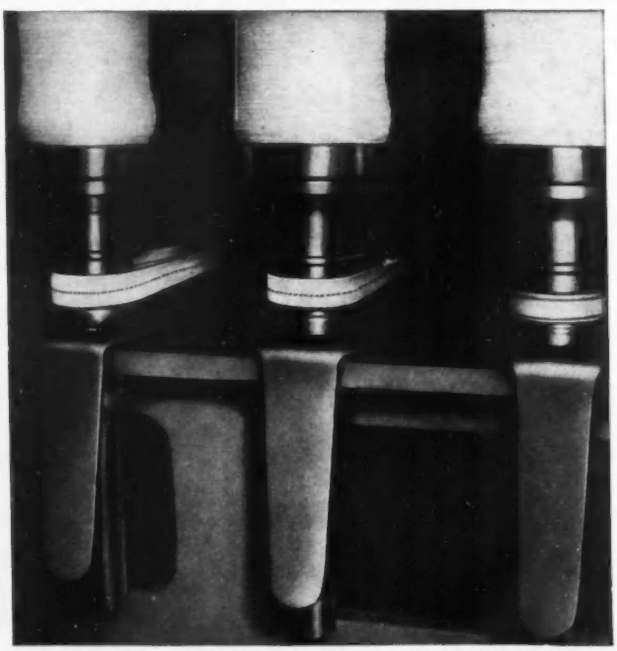

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MATERIALS - PROCESSES - PRODUCTION - MANAGEMENT

NO. 1000. VOL. 84 - APRIL 1958 - MONTHLY Two Shillings and Sixpence

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THE TEXTILE MANUFACTURER (*Incorporating* TEXTILE INDUSTRY AND EXPORTER, THE TEXTILE MACHINIST, THE HOSIERY, LACE AND SILK MANUFACTURER, *and* THE TEXTILE COLOURIST) is published on the first Monday of every month.

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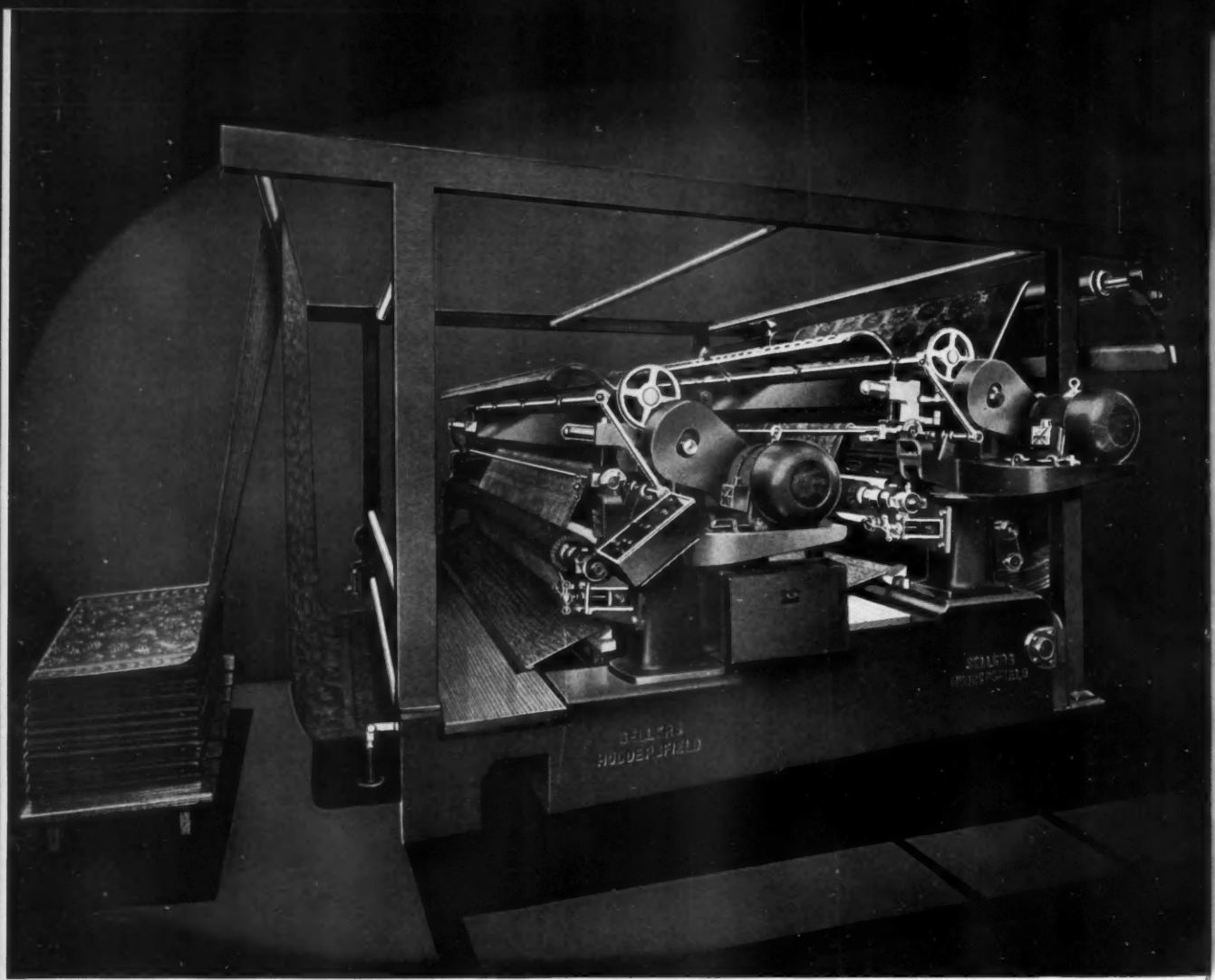

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Notes of the Month

WOOL RESEARCH PROGRESS REPORT

A REPORT of progress in the development of "easy-care" wool garments comes from the Wool Industries Research Association. In his annual report, Dr. A. B. D. Cassie, director of research, refers to a number of points under this heading. Shrink-resist processes which have been developed by the Association were successful in eliminating felting during washing, he states, and the aim of the new work would be to preserve shape as well as size of garments during and after laundering. It was planned to study the use of setting agents in combination with shrink-resist treatments. These, together with proper attention to knitting structure, should provide enhanced stability of wool fabrics —particularly knitted fabrics. Dr. Cassie said commercial development of the peracetic acid process had continued during the year. It was being used more extensively by firms finishing hosiery fabric and half-hose. The problem with all wet shrink-resist treatments was to control the initial attack on the wool by the reagents, and pre-treatment by methods other than peracetic were being investigated with a view to maintaining improved control at this stage.

In scouring and combing, experience with the pilot raw wool scouring plant had emphasised the need for a more versatile set for research work and necessary modifications would be made to the present set. A new Taylor Wordsworth comb had been installed; other new machinery included a punch and an "Auto-leveller" finisher. Experiments had confirmed that the tear in combing could be predicted from fibre-length measurements made before combing; this finding could be put to good practical use in deciding on certain details of processing procedure prior to combing. The value to the worsted industry of the W.I.R.A. rapid oil extraction apparatus had been indicated by the fact that well over 200 of these had been sold to member firms.

In woollen carding, trials at Torridon had substantiated the claims of some firms which had developed fancies designed to enable the frequency of fettling to be reduced. A warning note was sounded, however, regarding devices of this nature; a solid foundation of "fettlings" might be built up, the removal of which might be difficult without damaging the card clothing. In spinning, it was now reasonably certain that the periodic twist variation to be found in any mule-spun yarn occurred in the short length of yarn between the delivery rollers and spindle tip when the carriage was at its innermost position. This short length of yarn was twisted twice on successive draws, and the double twisting was not completely removed before the yarn was wound on the cop. Because of this and other factors there would be some advantage in reducing the length of yarn at the innermost position. Mule spindle bearings that required no oiling had been tested at Torridon and found satisfactory. Some member firms were now trying them in the mill; these sintered metal bearings were impregnated with P.T.F.E. (polytetrafluorethylene).

The report draws attention to the fact that worsted sliver can be twisted by rotating the can into which it falls from the machine. It is an alternative to the normal spindle, bobbin and flyer method of inserting twist and the rotating can method was being used on the Raper "Autoleveller" draw box at Torridon. This enabled greater output and larger packages to be obtained from the draw box. Much help was given to the industry during the year in dealing with blends of wool and synthetic fibres particularly in the achievement of more uniform blending of the fibres; this could be of importance in the appearance of the fabric spun from the yarns. The Association had been able to help manufacturers of fine shirting and blouse fabrics. Irregular fibrous surfaces had developed on materials made from a blend of wool/cotton, wool/rayon staple and wool/wool of different finenesses and investigations had shown that the finer wool fibres worked their way to the surface. This confirmed the recommendation that only fibres of similar fineness and length distributions should be blended together —particularly for yarns of soft twist.

Finishers had been experiencing difficulty in scouring wool/"Terylene" worsted cloths; scouring routines that had proved satisfactory for all-wool cloths were found to be unsatisfactory for the blended cloths. The experience of finishers was confirmed, that combing oils were retained more tenacious by "Terylene" than by wool. Preliminary investigations at Torridon led to the development of special scouring routines for these cloths and further investigations designed to find the most satisfactory and economical methods were meeting with success. An interesting finding was that light bars and streaks in these cloths had been due to exposure of the cloth to light before scouring. Exposure to light accelerated the oxidation of the combing oil, and it had been established that the oil was more readily removed from "Terylene" as its state of oxidation advanced. Hence the oil was more readily removed from the areas exposed to light before scouring. The same effect was not important with all-wool cloth because there was little difficulty in removing combing oil from wool. Some interesting results had been emerging from the studies of productivity in weaving. So far the observations on automatic looms had been confined to woollen wefts and weft stoppages associated in some way with pirn transfer ranged from 30% to 80% with an average of about 45%. About one-tenth of the total weft stops occurred in the final pick of the spent pirn, due either to faulty detection or to the bunch not unwinding correctly. A further 20% of the total stops occurred before the completion of the first pick of the new pirn, about half of these before the pirn entered the shed.

The appearance of fabrics was known to be sometimes spoiled by a lack of uniformity of tension in the yarns and the work of many years in this field by the staff of the

Galashiels laboratory was now beginning to bear fruit in several practical forms. Recent experiments were revealing the degree of tension control that was necessary in any commercial winding process. At the same time a study had been made of tension devices used by the industry; the object was to determine just how far they did control the tension of the yarn as it was being wound.

If the balance of colour in marl yarns was to be maintained the thickness of the singles, from which the two-fold was made, must be reasonably uniform. One way of doing this was to grade the cops of yarn so that suitable singles were twisted together. A machine being designed at Galashiels for automatically sorting cops should be useful too for selecting single hosiery yarns of more constant count. Oiled yarn kept in store might gradually turn a yellowish colour. Little could be done to prevent this at present but more light had recently been shed on the cause, and this was the first step in finding a remedy. The trouble was due to a substance called tryptophan, a constituent part of wool. When wool was steamed and stored with certain oils the tryptophan content of the wool was reduced and it was this which caused the yellowing.

* * *

PLAN FOR WEAVING REDUNDANCY

SPONSORED by the Cotton Spinners' and Manufacturers' Association and the Rayon Weaving Association, a new company—Weaving Reorganisation Ltd.—has been set up to grapple with the many factors associated with excess production capacity by buying and shutting certain cotton and rayon weaving sheds. Although the haphazard closing down of approximately 200 mills over the past three or four years has certainly removed some of the surplus looms and preparation machinery, the fact remains that the pace has definitely not been sufficiently rapid to appreciably affect and improve the prospects of those firms still remaining in business.

A statement outlining the policy of the new company points out there is a surplus of looms in the cotton and rayon weaving industry which creates a constant risk of over-production and tends to weaken its competitive capacity. Some of the machinery is out of date but in present conditions there is little or no incentive to undertake the heavy financial risk of re-equipment; yet it is essential to find means for putting the industry on a sound footing for the future by reducing its equipment in quantity and improving its quality. One method of achieving this end, the statement continues, is for a proportion of the firms in the industry to close down, a step which it is believed some firms would be willing to consider if they could do so on reasonably advantageous terms. The provision of facilities for taking over and closing down such firms would therefore serve the two-fold purpose of directly assisting such firms and also of helping to create conditions which would encourage the industry's further re-equipment and the extension of shift working which normally goes with it. It is with these objects in mind that Weaving Reorganisation has been formed.

The statement emphasises that participation in the company's operations by firms wishing to close down will, of course, be purely voluntary but the terms on which the company propose to take over such firms are designed to appeal mainly to those which have not re-equipped, and these terms could be expected to compare favourably with other methods as the chief object is to assist the industry rather than to secure a profit. Provisions will be incorporated in the scheme regarding redundant employees at firms closed down under it. The company will seek to raise most of its finance from outside the industry but will look to the industry itself to raise some finance which, it is proposed, should take the form of interest-bearing loans, and the consent of the Capital Issues Committee will be sought as soon as possible. The chairman of the company is Mr. J. H. King and the directors are Sir Cuthbert Clegg, Mr. E. W. Cockcroft, Mr. J. D. Greenwood, Mr. S. L. Mason, Mr. R. W. Pennington and Mr. W. T. Shackleton; and the address of the company secretary (to whom inquiries should be made) is 9 Lower Mosley Street, Manchester 2. Under the articles of association of the company its directors, besides being themselves under an obligation of secrecy, have appointed a chairman and are appointing a managing director not directly engaged in the industry who will have exclusive power to ensure that initial transactions between the company and prospective sellers are conducted in strict confidence.

This effort by the weaving side of the industry to voluntarily tackle its redundancy problems is commendable although, of course, there will be many different opinions about the best methods for dealing with it. It could be a very painful operation, but far better at this late stage to welcome action of a positive nature than to drift on despairingly whilst the inevitable chaotic contraction works itself out in piecemeal fashion amongst machinery, operatives and districts. Fortunately, past experience on the spinning side with the surplus spindles board in 1936 proved the wisdom of concerted action and even now provides a pattern for close study. This task in weaving calls for tremendous courage and the most penetrating insight but, if it will lead to higher efficiencies and stabilised conditions *without strangling initiative and enterprise*, then it deserves every encouragement and success.

* * *

JUTE TRADE COUNCIL MEETING

AT the recent annual meeting of the British Jute Trade Federal Council, Mr. W. H. Valentine, retiring chairman, said it would benefit the jute trade if certain political influences affecting it could be clarified. He said that industrial activity generally was moving at a slower pace for the time being. It was enough to cope with these normal hazards of trade, but it would certainly help if national and international political influences could be clarified during the present year. The home jute industry, with its heavy expenditure on modern plant and equipment in recent years, coupled with its new research foundations, active salesmanship and publicity, had already done much to adjust itself to modern conditions. Current uncertainty might have affected some forward plans or imposed caution for the time being in the board rooms, but it was hoped the difficulties would pass quickly. Mr. Valentine said that the basic problems of the home jute trade had arisen since the partition of the Asian sub-continent. On the problem of the supply and price of raw jute, he declared that so long as Pakistan pursued a policy of unenlightened self-interest, her economic future and the future of the world jute industry would remain uneasy and unsure. Competitive pressure from substitute materials and methods was growing in several important markets for jute goods and no jute manufacturer or merchant in this or any other country could strike back with full force if raw material policies were against him.

Control of Dust and "Fly", etc., in Textile Processes

Dust can affect the health of operatives, machine efficiency and life and quality of the finished product. Clean workrooms are undoubtedly happier places to work in and this factor alone is a distinctive incentive to higher productivity

By F. H. SLADE, A.M.I.MECH.E.

THE specific nature of the processes involved in the manufacture of textile yarns and fabrics make it desirable that an adequate system of dust removal and collection is installed; to safeguard health of the operatives, improve quality of the product and to increase production. A further important consideration is that of reducing fire risk; where the dust created is of an inflamable character. Compliance with the Factories Act regulations provides minimum safeguards, but it can safely be assumed that extension of these secures considerable overall economic advantages. To quote but one example the more congenial environment attendant on clean workrooms has a definite bearing on increased productive efficiency of operatives.

Health of textile operatives is of paramount importance. This would be seriously impaired if the dust emitted from the various machines were not suppressed; it is usually of an injurious nature. The possible effects of dust on health are many, both direct and indirect. It is, for example, directly responsible for byssinosis in mill operatives exposed to dust-laden atmospheres for a number of years. On the other hand dust can have an indirect effect by acting as a disease carrier. An outstanding example here is imported wool, a considerable quantity of which frequently contains bacilli of a harmful character. In this case it is imperative that the fine dust is collected from the product before it can pollute the atmosphere.

Insofar as the actual plant is concerned, the detrimental effect of dust is evidenced on the goods produced and on operating machinery of all types. Soiling, and resultant spoilage, of fabrics, especially those of delicate character, can occur right up to the point of despatch. In some cases, efficient processing is well-nigh impossible unless carried out in clean environments. The effect of dust on machinery is equally well-known. In dust-polluted atmospheres frequent stoppages are necessary to clean the machines; to enable them to operate at maximum efficiency. Wear and tear on moving parts is also accelerated.

General Control

It is obvious that there are two solutions to the dust problem in textile plant. One of these is to effect general control by means of an air conditioning plant and the other is to use air as a tool to collect and transport unwanted dust from its points of origin to a convenient receptacle instead of introducing or extracting air for its own sake from spaces as distinct from points. In actual fact, where the incidence of nuisance is high, resort should be had to a combination of both methods.

Every case will not, of course, demand the amenities of a full air-conditioning system; such as the Sirocco installation illustrated in Fig. 1. The degree of temperature and humidity control may not be necessary. However, there are but few cases where partial air conditioning cannot be usefully employed, and in these, as with the complete installation, provision should be made for ensuring compliance with the factor "air purity." This inclusion is required to cleanse the air of those dust particles, if present in any quantity, of under 10 microns in diameter which are claimed to be responsible for industrial diseases.

Many types of commercial air filters are in current use, of which the dry, or fabric, type is probably the most popular. These, primarily, make use of the screeing action of the filtering media to arrest particles larger than the dimensions of aperture

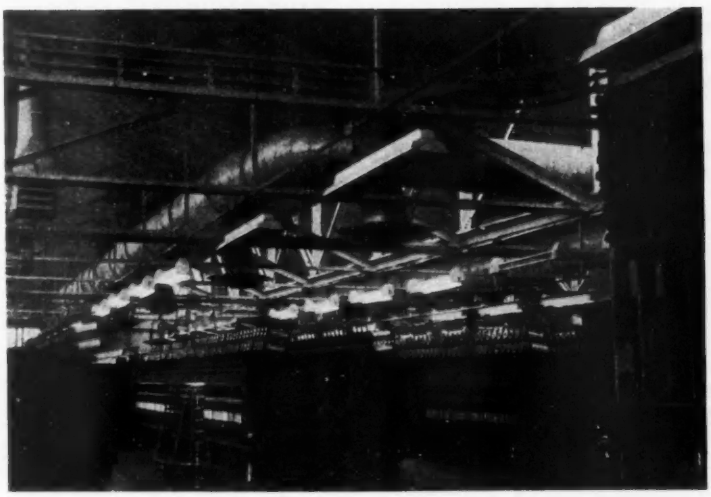


Fig. 1. A properly designed air-conditioning system ensures a minimum of air borne fly and fluff in the spinning room.

in the material. Impingement type filters also form an important group. The principle of air cleaning in these devices is that of adhesive impingement; dirt and dust in the air are trapped and retained by successive impingements on coated surfaces. A comparatively recent development is the electrostatic type. It is not a filter in the true sense, relying on electrically charging the dust particles so that they may be caused to adhere to surfaces of opposite polarity.

Figs. 2 and 3 illustrate two important textile processing applications of the "Precipitron," an electrostatic air filter produced by Sturtevant Engineering Co. Ltd. In this, very high collective efficiencies are obtained by greatly increasing the natural charge of the dust particles

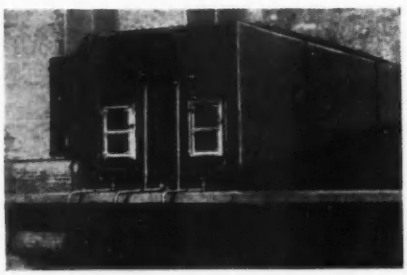


Fig. 2. High quality lingerie material is protected against soiling from atmospheric dust by this "Precipitron" installation in the Midlands

and then passing these particles into an entirely separate section where the electrostatic collecting forces are maintained at a maximum under all conditions. By separating the processes of charging and collecting the dust, the particular requirements of atmospheric air filtration are satisfied.

The water spray apparatus, or air washer, is an important item in the ventilation plants of industrial buildings, for whilst it is primarily installed to adjust the conditions of temperature and humidity, it is moreover, an effective air filter, and in many instances, it fulfils all requirements in the combined duty. Fig. 4 illustrates a typical "Sirocco" unit, the makers of which are Davidson and Co. Ltd. Any air washer consists essentially of a chamber through which the air passes and comes into intimate contact with water. This contact between the air and the washer water is secured by a number of methods, of which, for the purposes under consideration, a combination of water sprays and wetted plates offer advantages. It is the latter, termed

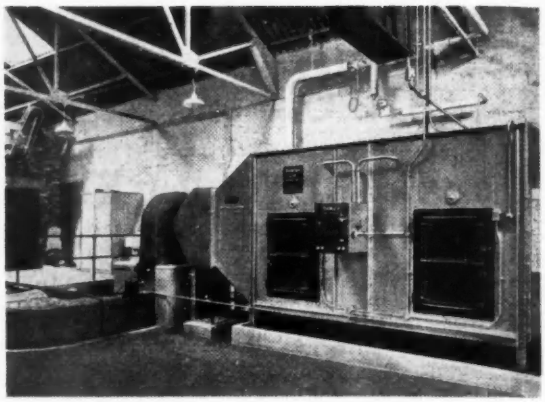


Fig. 3. A "Precipitron" is used here for reducing to negligible proportions the soiling of white Angora wool during the storing process

"scrubbers," and consisting of eliminator-type baffle plates placed in the air stream to cause several reversals of the direction of air flow, that are effective as air cleaners.

Local Control

This form of dust control falls within the orbit of industrial exhaust systems, wherein design procedure follows the common plant of (*a*) surveying the problem to see if less dust can be formed by the specific process, (*b*) preventing as much dust as possible from escaping into spaces where it is unwanted, (*c*) conveying this collected dust to a central point, (*d*) separating the dust from the conveying air and (*e*) disposing of the dust so separated. From (*b*) it will be seen that dust control is effected at the point of generation, or locally, so differing from general control where the control is effected to remove dust from air entering, or recirculated within, a working space.

There are two general arrangements of exhaust system, the central and the group. In the central system a single or double fan is located near the centre of the workroom with a piping system radiating to the various equipments to be served. In the group system, which is sometimes employed where the machines to be served are widely scattered, small individual fans are located at the centre of machine groups. This arrangement has the advantage of flexibility. Exhaust systems are also classified by the means employed to collect dust or other materials handled. The dust or refuse may be collected and controlled by enclosing hoods, open hoods, inward air leakage, or by exhausting the general air of the room.

Fig. 4. Designed primarily to regulate the moisture and heat content of air passing through it, the air washer will, moreover, effectively function as an air filter

With some classes of machinery it is not feasible to closely hood the machines and in these cases open hoods over or adjacent to the machines are provided to collect as much as possible of the dust. The open hood should be placed as close to the source of dust as possible, with due regard to the movements of the operator. The actual removal of dust or waste by means of an exhaust hood requires a movement of air at the point going in sufficient to carry it to a collecting system. The air velocities necessary to accomplish this depend upon the physical properties of the material to be eliminated and the direction and speed with which it is thrown off. If the dust is already in motion the hood should be installed in the path of the particles so that a minimum air volume may be used effectively. It is always desirable to design and locate a hood so that the volume of air necessary to produce results is as small as possible.

No set rule can be given regarding the shape of a hood for any particular operation, but it should be borne in mind that its essential function is to produce an adequate velocity distribution. The fact that the zone of greatest effectiveness does not extend laterally from the edges of the opening may frequently be utilised in estimating the size of hood required. Another feature to remember is that air volumes used to control many dust discharges may often be reduced by effective baffling or partial enclosure of an operation. This procedure is recommended where dusts are directed beyond the zone of influence of the hood.

Blowing Room

Space precludes a full analysis of the dust problems encountered within the many branches of the textile industry, or for that matter in the processing of a single material. For this reason it is intended to deal briefly with a few of these materials which if not subjected to dust control would prove extremely difficult to process; for example cotton. Many of the dust problems encountered here are experienced in similar or modified form in other textile mills. Although a high proportion of the impurities contained in seed cotton is removed during ginning, a considerable amount of seed, dust, dirt, etc., still remains in the baled raw cotton on its arrival at the mill. Thus the machinery in the blowing rooms must function not only to prepare the cotton for subsequent processing, but also to remove the unwanted impurities.

Cleaning[1] of the raw cotton is effected by mechanical and pneumatic means. In those cases where the latter cannot be applied atmospheric contamination is bound to result and it is here that resort must be had to dust control methods of one kind or another. A typical blowing room process machinery layout would comprise bale opener, hopper feeder, porcupine opener, vertical opener, dust trunk, hopper feeder, triple drum opener, and scrutcher and lap machine.

The process of cleaning is completed in the carding engine wherein not only are the matted fibres of the lap straightened out and placed as parallel as possible, but the impurities remaining after processing in the blowing room are removed. Theoretically, very little cleaning should occur at the card, but under the existing conditions of high productive output, the entry of dirty laps is not an infrequent occurrence.

From the point of bale opening the incorporation of dust extraction as an integral part of machine design is a common feature. The cleaning properties of a bale opener, for example, is assisted by the application of a dust-removing cage, and exhaust fan, which takes off foreign matter and conveys it through ductwork to a suitable dust chamber or filter. In the hopper feeder dust is extracted by an exhaust fan with duct connection to a hood over the feed box, whilst in a porcupine opener the space under the feed box forms a large capacity dropping box providing ample space for the collection of impurities; without interfering with the various air currents.

The base of the machine is also used as a dust collecting point in the vertical, or Crighton opener. This equipment is most effective for opening and cleaning cotton and thus lends itself to the processing of dirty and low grade material. The introduction of the vertical opener has to a large extent reduced the duties imposed upon the grid dust truck, with the result that those now generally used are only designed to remove light impurities such as leaf and mote. With these, any impurities finding their way as far as the grid bars are effectively handled, the grids preventing the impurities being drawn back into the path of the cotton.

Double and triple openers are usually employed where particularly heavy cleaning is necessary. This design of plant is interesting in that dust removed from the cotton is extracted to two points. Firstly, a considerable quantity of heavy foreign matter is deposited on the floor under the machine, and secondly, lighter particles are removed from the cotton via dust cages by means of a separate fan fitted to each pair of cages. It is thence delivered to a dust-settling chamber. A pair of dust cages, exhausted by a fan, is also incorporated in the design of single scutcher lap machines, together with a beater and the delivery rollers and mechanisms which form the completed lap. A typical installation is shown in Fig. 5.

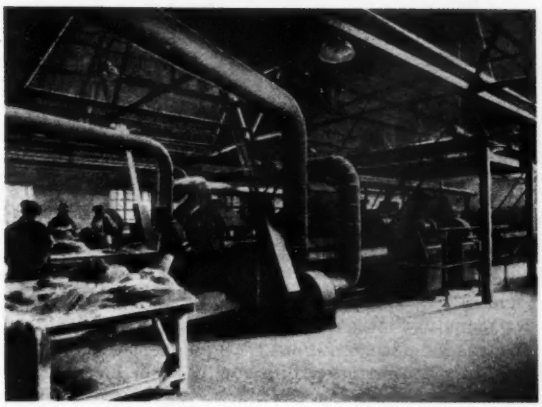


Fig. 5. Removing dust from scutchers with "Sirocco" equipment

Variants are made in layout, and the design of machine employed, to suit processing conditions demanded by the type of cotton handled. However, irrespective of these factors, operation under modern conditions is completely automatic and electrically controlled. Perfect blending is obtained by the use of two, three or

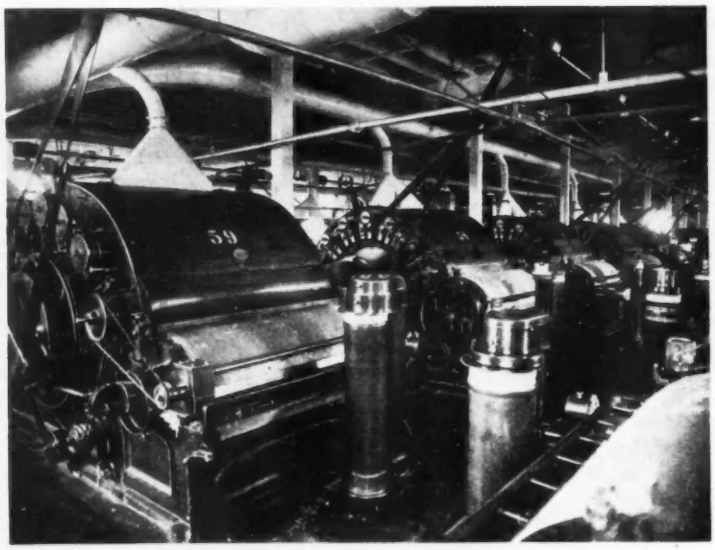


Fig. 6. Roller and clearer cards equipped with dust extraction system over the main cylinders. This in turn is connected to a main pipe line which eventually delivers into filter bags or some other form of dust receiver

four blending hopper feeders, and efficient cleaning and opening takes place without damage to the staple by employing the correct number of cleaning points for the particular grades of cotton handled.

It should, however, be remembered that as a very large volume of air is extracted by the blowing-room machinery, adequate arrangements should be made to allow a ready inflow of air to this space. All air inlets and passages leading to the blowing room should be of ample area. Furthermore, the success of a dust removing plant depends upon many factors such as correctly-designed hoods, where used, to collect the dust as near as possible to the point where it is made without interfering with the process, whilst the ducting must also be carefully designed with branch connections at the correct angles to ensure a smooth air flow with the minimum of friction.

Cardroom Dust

Fig. 6 illustrates an extraction system, by Matthews and Yates Ltd., applied to a card. The problem here is the clearance of dust liberated during stripping and that arising from carding, i.e. process dust, including fly and other extraceous matter. The former can be prevented from escaping into the room by either one of two methods. The first of these is to exhaust by vacuum applied directly to the cylinder and doffer, and the second, by using a stripping brush with hood or casing connected with an exhaust duct.

Process dust arises from a number of points, these being the licker-in, flat comb and brush, space between the flats, doffer comb, base of the card under the licker-in, and the portion under the cylinder. In the case of roller and clearer cards installation of a dust removal system is comparatively simple, but some difficulties have been experienced with revolving flat cards. The dust problem in processes following carding can generally be alleviated by means of air conditioning plant and vacuum cleaning equipment.

Local control may also be effectively applied during the preparation of flax, as shown, for example, in Fig. 7. This reproduced photograph illustrates Sirocco equipment fitted to hackling machines. As observed by Shuttleworth, the end gables on these machines do not create any dust, and need not be fitted with dust collection, but the other four working gables require to be fitted both inside and outside making eight separate collecting points per machine, or one per sheet of hackle pins. The hackle pins are cleaned by a rotating brush, the brush by a doffer, and the doffer by a knife; the resulting tow drops into the boxes at the base of the machine. The bulk of dust is generated at two points, in the combing action of the hackle pins, and the cleaning action of the brush. As these two points are relatively near each other, the dust can either be drawn downwards, by exhausting near the brush, or upwards by exhausting over the hackle sheets.

During subsequent hand hackling dust is created at the hackle pins, and this is removed by exhausting at a grating at the rear; connected to a duct fan and filter. The action of spreading also liberates more dust; exhausted by a narrow mouthed hood near to the drawing roller. The enclosed design of the carding engines assists considerably in designing an effective system to handle the air borne dusts due to the operation of these units. Two exhaust pipes are fitted to the machine casing, one at the rear of the automatic feed and the other to the

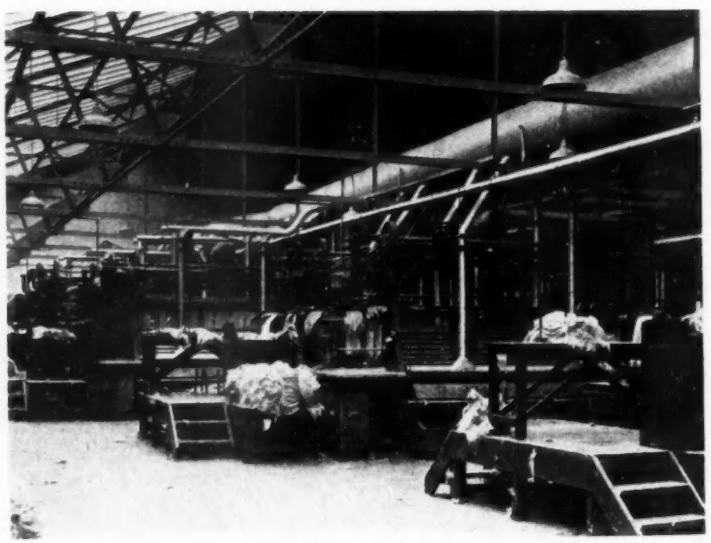


Fig. 7. Dust collection and ventilation for flax hackling machines. The bulk of the dust is created in the combing action of the hackle pins and the cleaning action of the brush

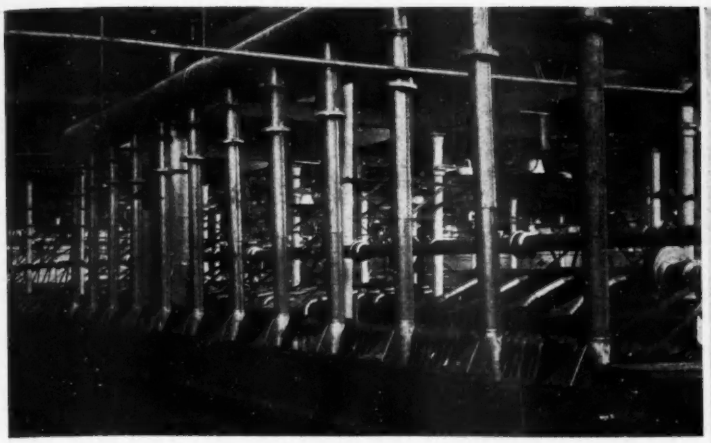


Fig. 8. Further view of dust extraction equipment fitted to spinning machinery. The drawing action of the frames liberates a fine air-borne dust which is exhausted by narrow mouthed hoods

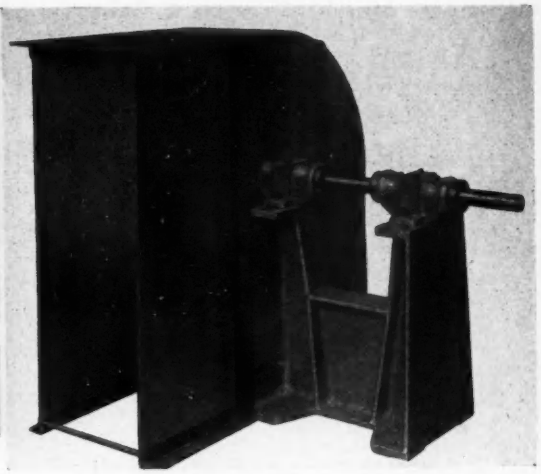


Fig. 9. Fans of the paddle type are used for handling textile dust. The cyclone fan illustrated is made in a range of 18 sizes

floor level under the cards, creating an inward flow of air to the machine and preventing the escape of dust to create nuisance. A large hood extends over the doffer and brush where the cards are stripped, and a small telescopic pipe and hood is fitted over the delivery roller also. A bell-mouthed pipe is provided where the operator is taking tow from the bag to feed the machine.

Dust extraction is equally important during drawing and roving, and also during the finishing stages; as during yarn softening. Some difference of opinion exists as to whether it is necessary to fit extraction plant beyond the drawing frames, but it can generally be taken for granted that a large amount of dust and fly emanates from the roving frames, especially from the bobbins which revolve at high speed and from the falled bars also. Machines equipped to cater for all these dust-producing points are illustrated in Fig. 8; a typical Sirocco dust remove and collecting plant.

Another interesting installation by the same concern is designed to deal with 21 rows of roving and drawing frames, each row having 47 heads and one short row with 21 heads. One 4 ins. dia. branch was provided for each head, and, in addition two 4 ins. branches on each of 24 doublers, and one 4 ins. branch on each of 15 spreadboards. The complete plant was therefore designed to deal with a total of 1,071 4 ins. dia. branches. Basing upon a velocity of 1,500 ft. per minute, a Sirocco 84 ins. dia. Duplex dust fan was supplied, rated to handle 140,000 cu. ft. of air per min. against $1\frac{3}{4}$ ins. static water gauge, 280 r.p.m., requiring 80 b.h.p. upon the fan shaft.

The main ductwork was embodied in the building during its construction, and under each row of machines a main was formed below the floor level in reinforced concrete. Openings were provided in the floor to allow of the underground main being coupled up to the hoods which were fitted under each head; the connection to each main is by 4 ins. dia. branch controlled by a damper. All the underground mains are carried out through one side wall and coupled up into a large concrete duct leading to the inlets of the duplex dust fan. The dust-laden air from the fan discharge is delivered right and left into the collectors.

An air speed in the order of 2,900 ft./min. in the exhaust duct is considered sufficient as a conveying velocity for textile processing dusts. This is provided by means of a pattern plate paddle-blade type fan, as shown in Fig. 9, which will handle dust without becoming choked. It should be observed that the multivane type of fan having a large number of small blades is not suitable for dust-collecting work. In some cases a fan with paddle-wheel type of impeller, in the form of a casting of aluminium alloy with a smooth finish, is used especially in conveying work where damage to the staple is to be avoided.

(*To be continued*)

Reference

(1) Shuttleworth, g.e., Dust Removal From Textile Factories; Proc. I.H.V.E., Vol. XVI, 155, 1948.

New Appointment

Mr. B. W. Dawkins has been elected chairman of Saxon Engineering Co. Ltd. and Bennis Mechanizations Ltd., both of Fenton, Stoke-on-Trent and subsidiary companies of Bennis Combustion Ltd., Little Hulton, Walkden, Manchester. Mr Dawkins is joint managing director of Bennis Combustion Ltd.

Lane Marking Tape for Factories, etc.

A new type of pressure sensitive vinyl plastic tape, for marking out lanes, aisles, parking and warning lines on factory and warehouse floors, is announced by the Minnesota Mining and Manufacturing Co. Ltd., 3M House, Wigmore Street, London, W.1. Known as "Scotch Boy" No. 471 lane marking tape, it is laid quickly and easily to clean, dry, hard surfaces, such as wood or concrete, provided it is not roughly pitted. White in colour, it is available in widths from $\frac{1}{4}$ to 4 ins. in 36 yd. rolls; 2 ins. is the width commonly used for industrial lane marking. The new tape may be laid on a clean floor after only dusting or sweeping. If the surface is oil or grease-stained a preparatory wash with a detergent is recommended. Once laid, the tape is said to be resistant to oil, water, caustics, acids and most commercial solvents.

Fuel Economy

A heat and power survey carried out recently by National Industrial Fuel Efficiency Service on a textile mill in Northern Ireland indicated that a saving of 9·6% of fuel (14% financial) could be made. In less than a year after the issue of the report the firm reported that annual fuel consumption had actually dropped by 16·8% even though all the recommendations had not yet been put into effect. The capital expenditure involved in effecting the saving amounted to less than half of the annual financial saving.

Materials Handling in the Textile Industry*

By A. L. WALLWORK, A.M.I.E.E.†

STATISTICS relative to the period 1920 to 1950 show that the amount of electrical energy consumed in industry has increased over tenfold in this country and yet the present amount consumed per man-hour is only about one-fifth of the corresponding figure in the U.S.A. These figures are affected to a large extent by the types of industry in the respective countries, but even if the gap is shortened there is ample evidence that there is scope for a more general use of electricity to improve conditions and to carry out many of the auxiliary functions in the factory to cut out unnecessary manual labour, thus speeding up production. Figures compiled by E.D.A. for 1950 (later figures are not available), show that only 1,500 units were consumed per operative in the textile industry compared with 2,500 units per operative in the engineering industry, 3,000 units per operative in other light metal industries, 3,000 units in food, drink and tobacco and 4,000 in paper and printing. Another interesting fact is that the unit consumption per £1 worth of product in the textile industry was 1·3 in 1950 compared with figures between 2·3 and 4·0 in other industries where it could be reasonably assumed that electricity is used under fairly similar conditions.

Materials Handling

It is important to point out that the application of many devices, such as for example a conveyor belt, does not mean that a great amount of energy is going to be used—a 1 h.p. motor using ¾ of a unit costing little over 1d. per hour in an electrified mill will drive a horizontal belt 50 ft. long carrying an average load of 10 lbs./ft. Similarly, a 1 h.p. motor will lift 10 cwts. at 25 ft./min., and the battery of a ½ ton electric truck can be charged up during the night for something in the region of 10 units. Maintenance costs should be very small for mains driven appliances such as conveyors and lifts, and if interest and capital replacement is calculated over 20-25 years the total yearly expenditure is comparatively insignificant when compared with the increase in productivity.

The cost of handling materials is inevitably a substantial part of the total production cost in any industry and research into this has revealed that it can amount to any figure between 15% and 85% of the cost of the product. In many industries a large proportion of these handling costs is related to manual labour and not only is this an extravagant method if there are alternative mechanical facilities available but it is important in this age of progress to ensure wherever it is practicable that men are relieved of these tasks and are given the opportunity to be engaged on more skilled work. This should not be difficult to find in the cotton industry, where the shortage of operatives in recent years has been a matter of concern to the trade.

Scope for Plant in Old and New Factories

The lack of space in old multi-storey mills is a real obstacle to the installing of some modern handling devices such as roller conveyors, continuous vertical chain elevators and truck runways, and in many cases due to the design of the buildings the projects might prove extremely costly. Nevertheless, the gradual disappearance of overhead countershafting has provided space for monorail conveyors and many are now in use, and no doubt it will be agreed that mechanisation is essential if the flow of materials is to be steady in an old mill.

Referring, however, to the primary task of handling bales and to the final warehouse facilities and dispatching, it would appear that the methods adopted in many mills even with motorised pulley blocks prove slow, having in mind the much larger capacity road vehicles, and there would seem to be a case for the fork lift truck where space to manoeuvre is available. One too often sees the use of old iron wheel type sack trucks as part of the unloading and sheer manhandling for stacking, with the increased accident risk that is created.

The old type of hoist used between floors is an intermittent carrier and much time is lost in operation. The substitution of continuous vertical chain elevators, where space is available, should pay dividends in some cases. There also seems to be very little use of chutes or roller conveyors for downward movement of materials.

I appreciate that any projected use of new equipment depends on many factors and it is of course the job of the management with their experts to determine what can be done. By and large, however, the handling of bales, particularly where they may have some distance to travel, cannot be too carefully investigated and one useful appliance for this is an overhead monorail runway with an automatic electric pulley block which travels by itself.

With regard to mechanical handling between the blowing room and cardroom, monorail overhead conveyors are in general use and similar equipment can be utilised in the transitional processes of combing, drawing, slubbing and roving before spinning. In the preparatory stages before spinning movement of materials is limited in most cases, and as they are also light I should be extra cautious in making any case for conveyors, but some firms have used overhead monorail chain conveyors for the transport of cops to the winding section and for return of empty tubes.

Handling of beams through sizing, drawing-in, weaving, bleaching and dyeing calls for the use of monorail runways and overhead cranes. The electric chain pulley block now takes all the work out of this particularly heavy task where there is space for an overhead rail. There also seems to be a field for the extension of the use of roller conveyors for transport to plating and cropping machines along to cloth inspecting and warehousing, and finally the use of small electric trucks for waste disposal and probably other ancillary uses in the modern cotton mill.

In new single storey factories all these handling devices can be so co-ordinated into the design of the building and of the preparation, spinning, weaving, dyeing, printing, finishing plant, not to mention all, that the problem is much simpler and must necessarily be more efficient in their general utilisation. It is often possible to so design the factory plant layout to avoid re-handling and in some cases to combine two or more operations into one. Some processes combine the necessary handling plant, as for example modern pirn winders can be provided with elevators and conveyors to feed pirns to the winding heads, and I believe in the Barker Colman automatic spooler conveyors are used to transport the empty bobbins.

Electric trucks are made in a variety of types and sizes. They are simple to operate, the controls are light and where either a man or woman is turned into a truck driver rather than a labourer there is a greater sense of responsibility in the work done. Charging the batteries is normally done during the night and where a mill runs on single or double shifts the cost of energy for this purpose is related only to the unit running charge in the Electricity Board's industrial two-part tariff. The fork truck enables higher stacking in warehouses and various types can be obtained to suit specific requirements in a particular industry.

* *From a paper given recently to Blackburn Textile Society.*

† *Power Sales Engineer, North Western Electricity Board, Blackburn.*

New Coating and Costume Cloths

Reproduced full size in order to show detail, the fabrics arranged on the facing page are some of the range of attractive designs from Marshall, Kaye and Marshall Ltd., Ravensthorpe, Dewsbury. Brief details of these 54 ins. cloths are as follows:—

(1) A1318. A neat effect in a costume weight, mixture piece-dyed cloth, oatmeal shade (13/14 ozs.).

(2) A1450. Freize cloth suitable for light coats or costumes in a very attractive shade of mauve (16/17 ozs.).

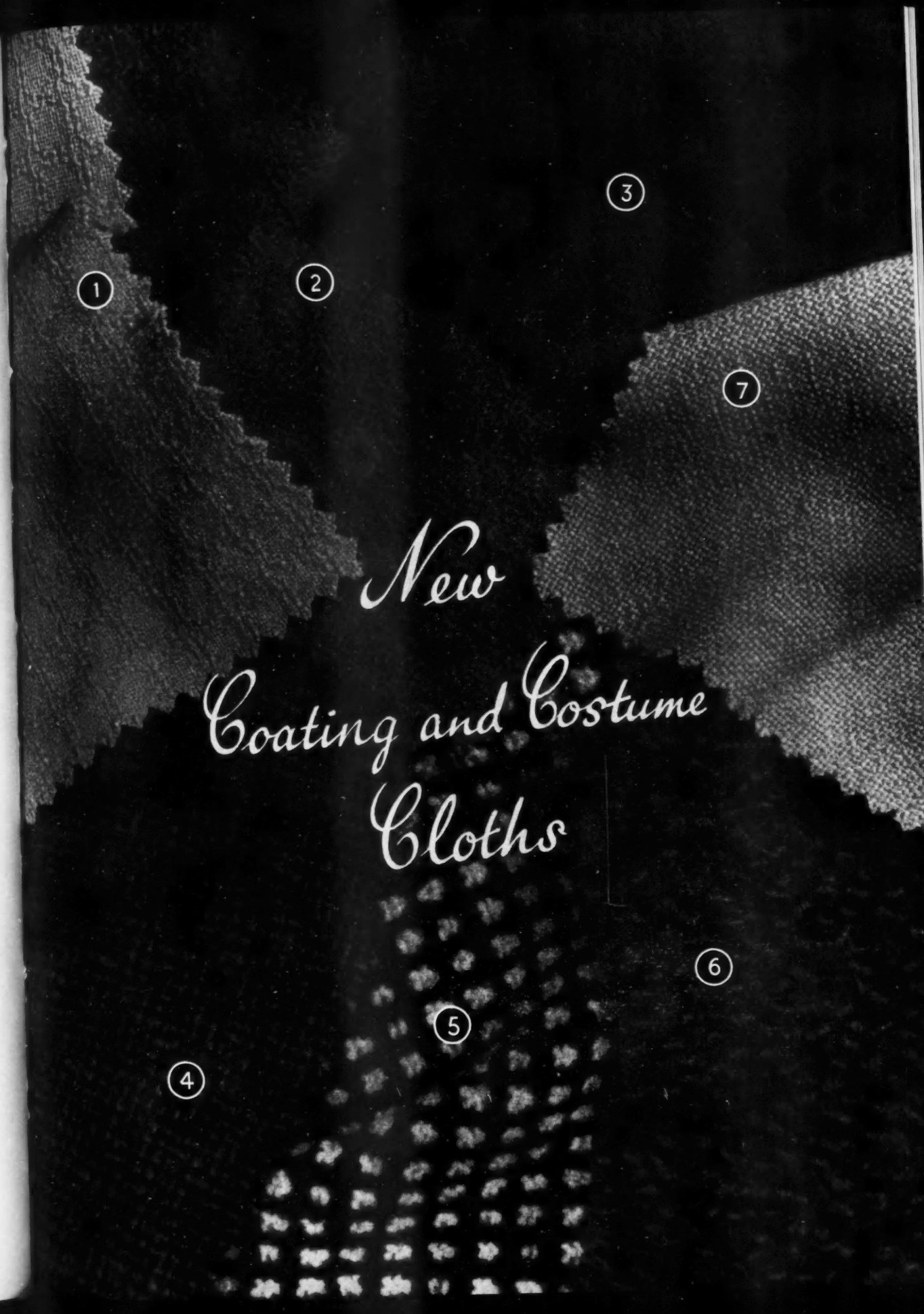
(3) A1174. Medium priced face cloth—coating weight—in a lustrous royal blue shade (19 ozs.).

(4) 6974. Mixture tweed—peacock blue, crimson and black—for light coats or costumes (15/16 ozs.).

(5) 6950. Black and white tweed, medium priced, coating weight (18 ozs.).

(6) A1440. Large curl astrakhan, coating weight, in a smart turquoise shade (24/25 ozs.).

(7) A1469. Plain crepe style mixture, costume weight, in pale blue (14/15 ozs.).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Cloths
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A Study of Some Factors Affecting the Pulling of Rags*

Amongst many other factors it is shown that a 33% increase in swift speed (428 to 570 r.p.m.) resulted in a decrease in thread content, but a further increase to 750 r.p.m. had no apparent effect on the composition of the shoddy

By C. D. MEYER and P. P. TOWNEND, B.SC., PH.D., F.T.I.

IN Table 17 ("T.M.," Feb., p. 66) the effect of swift speed on the percentage fibre in the shoddy has been considered for various pulling conditions, viz., feed roller speed, setting and diameter, population of swift, position of the bit box slide, bit roller setting and, finally, for varying rates of production. The mean figures for percentage fibre in the shoddies pulled under the swift speeds of 428, 570 and 750 r.p.m., have been given in the final column and it will be observed that under these three swift speeds these were, respectively 86·7, 89·6 and 89·8%. It would therefore seem that for this particular type of rag one will obtain slightly less thread when the swift speed is raised from 428 to 570 r.p.m., but a further increase to 750 r.p.m. has little or no effect on the composition of the shoddy.

Considering the effect of changing the swift speed on the seven variables, i.e., feed roller speed, feed roller setting, etc., then it would seem that the greatest effect is obtained by feed roller speed, feed roller setting and rate of production, for it will be seen in Table 17 that whereas the mean figure for the percentage fibre for the three feed roller settings for swift speed of 428 r.p.m. min. was 81% whereas the mean figure for 570 r.p.m. min. was 90%. And if one takes the corresponding averages for the rate of production it will be seen that the figure for the 428 r.p.m. was 85% and that for the 750 r.p.m. 92%. A similar difference was produced in the case of feed roller settings. It is interesting to observe that increasing the swift speed for the same population of swift and indeed for different densities of pinning did not appear to bring about any significant change in the fibre content of the shoddy.

In Table 18 the effect of feed roller speed on the percentage fibre in the

* *An account of some original research work carried out in the Department of Textile Industries, University of Leeds.*

Table 18. The Effect of Feed Roller Speed on Percentage Fibre

	Swift speed			Feed roller setting		Feed roller diameter		No. of teeth in swift			Bit box slide setting			Bit roller setting			Rate of production			Mean percentage Fibre
Feed roller speed	428	570	750	¼"	½"	2⅛"	2"	5 × 26 × 45	5 × 52 × 36	10 × 50 × 46	0 sq. in.	138 sq. in.	219 sq. in.	No.	¼"	½"	1"	% fibre / lb./hr.			
6	81	91	91	91	90	91	85	88	91	89	91	93	96	91	93	94	92	95 / 244	91 / 122	89 / 61	90·7
9	87	91	88	91	81	91	89	84	91	90	91	91	95	91	91	92	88	86 / 366	91 / 183	90 / 91·5	89·5
16	76	87	86	87	89	87	84	82	87	88	87	89	91	87	91	94	93	83 / 652	87 / 326	84 / 163	87·0

Table 19. The Effect of Feed Roller Setting on Percentage Fibre

	Swift speed			Feed roller speed			Feed roller diameter		No. of teeth in swift			Bit box slide setting			Bit roller setting			Rate of production			Mean percentage Fibre
Feed roller setting	428	570	750	6	9	16	2⅛"	2"	5 × 26 × 45	5 × 52 × 36	10 × 50 × 46	0 sq. in.	138 sq. in.	219 sq. in.	No.	¼"	½"	1"	% fibres / lb./hr.			
¼"	87	91	88	91	91	87	91	89	84	91	90	91	91	95	91	91	92	88	86 / 366	91 / 183	90 / 91·5	89·8
½"	83	81	91	90	81	89	81	86	84	81	84	81	93	93	81	91	91	87	87 / 366	81 / 185	88 / 91·5	85·9

Table 20. The Effect of Feed Roller Diameter on Percentage Fibre

	Swift speed			Feed roller speed			Feed roller setting		No. of teeth in swift			Bit box slide setting			Bit roller setting				Rate of production			Mean percentage Fibre
Feed roller diameter	428	570	750	6	9	16	¼"	½"	5 × 26 × 45	5 × 52 × 36	10 × 50 × 46	0 sq. in.	138 sq. in.	219 sq. in.	No.	¼"	½"	1"	% fibre / lb./hr.			
2⅜"	87	91	88	91	91	87	91	81	84	91	90	91	91	95	91	91	92	88	86 / 366	91 / 183	90 / 91·5	89·4
2"	87	89	86	85	89	84	89	86	85	89	89	89	93	90	89	92	93	90	90 / 308	89 / 154	91 / 77	88·8

Table 21. The Effect of Number of Teeth in Swift on Percentage Fibre

	Swift speed			Feed roller speed			Feed roller setting		Feed roller diameter		Bit box slide setting			Bit roller setting			Rate of production			Mean percentage fibre
No. of teeth in swift	428	570	750	6	9	16	¼"	½"	2⅜"	2"	0 sq. ins.	138 sq. ins.	219 sq. ins.	No.	¼"	1"	% fibre / lb./hr.			
5 × 26 × 45 (5850)	86	84	87	88	84	82	84	84	84	85	84	86	85	84	88	87	88 / 366	84 / 183	86 / 91·5	85·5
5 × 52 × 36 (9360)	87	91	88	91	91	87	91	81	91	89	91	91	95	91	92	88	86 / 366	91 / 183	90 / 91·5	89·6
10 × 50 × 46 (23000)	90	90	91	89	90	88	90	84	90	89	90	91	90	90	94	91	89 / 366	90 / 183	90 / 91·5	89·8

shoddy has been considered for various pulling conditions, viz. swift speed, feed roller setting and diameter, population of swift, the position of the bit box slide, bit roller setting and finally for varying rates of production. The mean figures for the percentage fibre obtained under the three feed roller speeds 6, 9 and 16 r.p.m. have been given in the final column; viz., 90·7, 89·5 and 87%, respectively. From these it would seem that an increase in the feed roller speed will yield more thread or less fibre in the shoddy. But, again, it is clear that altering the feed roller speed from 6 to 9 r.p.m. had little effect on the fibre content of the blend compared with altering from 9 to 16 r.p.m.

In Table 19 the effect of feed roller setting on the percentage fibre in the shoddy has been considered for various pulling conditions, viz., swift speed, feed roller speed and diameter, population of switt, the position of the bit box slide, bit roller setting and finally for varying rates of production. The mean figures for the percentage fibre obtained under the two feed roller settings, ¼ in. and ½ in. have been given in the final column, viz., 89·8 and 85·9, respectively. From these it would seem that a wider feed roller setting will bring about less fibre and consequently more thread in the shoddy. In Table 20 the effect of feed roller diameter on the percentage fibre in the shoddy has been considered for various pulling conditions, viz. swift speed, feed roller speed and setting, population of swift, the position of the bit box slide, bit roller setting and finally the varying rates of production. From the figures given for the mean percentage fibre for the shoddies pulled with feed rollers of 2⅜ ins. and 2 ins. dia. it is difficult to detect any difference and so one can only conclude that such a small difference in diameter has no

Table 22. The Effect of Bit Box Slide Setting on Percentage Fibre

	Swift speed			Feed roller speed			Feed roller setting		Feed roller diameter		No. of teeth in swift			Bit roller setting				Rate of production			Mean percentage fibre
Bit box slide setting	428	570	750	6	9	16	¼"	½"	2⅜"	2"	5 × 26 × 45	5 × 52 × 36	10 × 50 × 46	No.	¼"	½"	1"	% fibre / lb./hr.			
Closed	87	91	88	91	91	87	91	81	91	89	84	91	90	91	91	92	88	86 / 366	91 / 183	90 / 91·5	89·1
138 sq. ins.	90	91	92	93	91	89	91	93	91	93	86	91	91	91	93	93	95	89 / 366	91 / 183	89 / 91·5	91·2
219 sq. ins.	90	95	94	96	93	91	95	93	95	90	85	95	90	95	91	94	93	92 / 366	95 / 183	95 / 91·5	92·9

Table 23. The Effect of Bit Roller Setting on Percentage Fibre

Bit roller setting	Swift speed			Feed roller speed			Feed roller setting		Feed roller diameter		Bit box slide setting			Rate of production			Mean percentage fibre
	428	570	750	6	9	16	¼"	½"	2¼"	2"	0 sq. in.	138 sq. in.	219 sq. in.	% fibre / lb./hr.			
¼"	92	91	93	93	91	91	91	91	91	92	91	93	91	93 / 366	91 / 183	90 / 91·5	91·6
½"	90	92	94	94	92	94	92	91	92	93	92	93	94	92 / 366	92 / 183	92 / 91·5	92·4
1"	90	88	90	92	88	93	88	87	88	90	88	95	93	90 / 366	88 / 183	89 / 91·5	89·8

effect on the fibre content of the shoddy. It would have been better had we been able to use feed rollers of more varying diameters, but this was not possible at the time and so we can only draw the above conclusions.

In Table 21 the effect of the population of swift on the percentage fibre in the shoddy has been considered for various pulling conditions, viz. swift speed, feed roller speed, setting and diameter, the position of the bit box slide, bit roller setting and finally for varying rates of production.

An inspection of the final average figures for % fibre given in the last column shows that an increased density of swift, namely, 9,360 teeth as compared with 5,850 teeth brought about an increase in the fibre content and therefore a decrease in the thread content. But a further increase in swift population, viz., to 23,000 teeth had no significant increase on the percentage fibre in the shoddy. Of course this statement is only true for the particular rag under consideration and it may not be true for other types of rag but nevertheless it is interesting that such a large increase in swift population from 9,360 to 23,000 teeth had no apparent effect on the fibre content.

In Table 22 the effect of the bit box slide setting on the percentage fibre in the shoddy has been considered for various pulling conditions, viz. swift speed, feed roller speed, setting and diameter, population of swift, bit roller setting and finally for varying rates of production, whether an increased area of opening led to an increase or decrease in the percentage fibre has been shown in the last vertical column. From these data it will be seen that an increased area of opening resulted in an increase in the percentage fibre in the shoddy since the fibre content was 89·1% when the bit box slide was closed and this became 91·2% when the area of opening was 138 sq. ins. and further increased to 92·9% when the opening was further enlarged.

In Table 23 the effect of the bit roller setting on the percentage fibre in the shoddy has been considered for various pulling conditions, viz. swift speed, feed roller speed, setting and diameter, the position of the bit box slide and finally for varying rates of production. Whether a wider bit roller setting led to an increase or decrease in the percentage fibre has been set out in the final column. Here it will be seen that increasing the bit roller—swift setting from ⅛ in. to ½ in. gave slightly more fibre in the shoddy, but a further increase to 1 in. resulted in less fibre. In view of this apparent contradiction it would seem that, so far as fibre in the shoddy is concerned, the bit roller—swift setting is not critical.

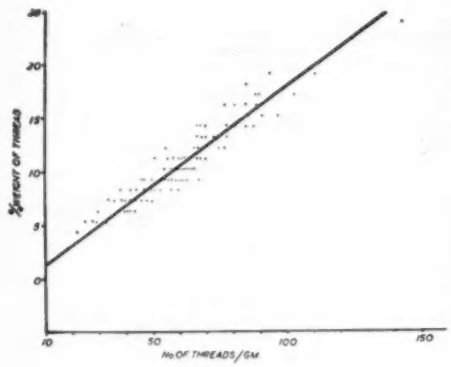
In Table 24 the effect of the rate of production on the percentage fibre in the shoddy has been considered for various pulling conditions, viz., swift speed, population of swift, feed roller setting, the position of the bit box slide, bit roller setting, feed roller speed and finally for feed roller diameter. It is clear from the mean figures given for the percentage fibre in the last column of this table that the rate of production has little or no effect on the fibre content of the shoddy, since pulling at the rate of 366 lbs. per hour gave a fibre content of 88·5% and pulling at the rate of 91·5 lbs. per hour gave 89·4%

Summary

Swift Speed.—One will obtain more thread at a low swift speed (viz., 428 r.p.m.), and a 33% increase (to 570 r.p.m.) will bring about some decrease in thread content although a further increase (570—750 r.p.m.) has

Table 24. The Effect of Production on Percentage Fibre

Rate of production	Swift speed			No. of teeth in swift			Feed roller setting		Bit box slide setting			Bit roller setting				Feed roller speed			Feed roller diameter		Mean percentage Fibre
	428	570	750	5 × 26 × 45	5 × 52 × 36	10 × 50 × 46	¼"	½"	0 sq. in.	138 sq. in.	219 sq. in.	No.	¼"	½"	1"	6	9	16	2¼"	2"	
																% fibre / lb./hr.			% fibre / lb./hr.		
366 lb./hr.	86	86	93	88	86	89	86	87	86	89	92	86	93	92	90	95 / 244	86 / 366	83 / 652	86 / 366	90 / 308	88·5
183 lb./hr.	87	91	88	84	91	90	91	81	91	91	95	91	91	92	88	91 / 122	91 / 183	87 / 326	91 / 183	89 / 154	89·6
91·5 lb./hr.	83	90	92	86	90	90	90	88	90	89	95	90	90	92	89	89 / 61	90 / 91·5	84 / 163	90 / 91·5	91 / 77	89·4



Graph 1. Percentage fibre weight of thread plotted against number of threads per gm. of shoddy

no apparent effect on the composition of the shoddy.

Feed Roller Speed.—Small variations in feed roller speed (6 to 9 r.p.m.) seem to have no apparent effect on the composition of the shoddy, but more marked differences (6 to 16 r.p.m. and 9 to 16 r.p.m.) will given an increase in thread content.

Feed Roller Setting.—Considering only two feed roller settings, viz., $\frac{1}{4}$ in. and $\frac{1}{2}$ in. then the latter will bring about an increase in the percentage thread.

Feed Roller Diameter.—The actual increase in thread content from one feed roller diameter to another, $2\frac{3}{8}$ ins. —2 ins. was so small that this particular difference had no significant effect so far as the percentage thread was concerned.

Population of Swift.—One will obtain more thread with a low number of teeth (viz., 5,850), and a 60% increase in swift population will bring about a decrease in thread content although a further increase from 9,360 to 23,000 teeth had no apparent effect on the composition of the shoddy.

Bit Box Slide Setting.—On the whole it would seem that an increased area of opening (from closed to 219 sq. ins.) will result in a decrease in the thread content.

Bit Roller Setting.—On the whole it would seem that a wider bit roller setting will not influence the percentage fibre in the shoddy.

Rate of Production.—On the whole it would seem that a lower rate of production will not influence the percentage fibre in the shoddy.

It will have been noticed that no reference has been made in the previous tables to the number of threads in the shoddies resulting from the various experiments, although these were counted in every case. This extra information was omitted in order to simplify the discussion, but the percentage fibre weight of thread in each sample has been plotted against the number of threads per gm. of shoddy in Graph 1 and it will be seen that there was a reasonable straight line relationship between the two. Thus it would seem that as the number of threads per gm. increase so does the weight of thread, and so in future work it would seem unnecessary to examine shoddies for both.

Effect of No. of Teeth Passing Feed Roller—Swift Point of Contact

Rag pulling is obviously brought about by passing a number of swift teeth past the rag as it emerges from the feed rollers. And when one considers this basic statement it is obvious that the number of swift teeth passing this point in unit time is governed by (*a*) the number of teeth in the swift, (*b*) the revolutions per minute of the swift and (*c*) the feed roller speed. Therefore the figures for percentage fibre in the samples obtained in the previous experiments have been related to the number of teeth passing the feed rollers in a given time, and these have been plotted in Graph 2.

The actual data regarding the calculations relating to the number of teeth passing the feed rollers are given in Tables 25 to 28.

From Graph 2 it will be seen that there is a steady increase in the fibre content of the shoddy as the number of teeth acting on the sample increase from 900,000 to 3,900,000, but a further increase to 9,600,000 in the number of teeth acting on the sample does not have a proportional effect on the percentage fibre obtained.

Table 25

The different numbers of teeth were obtained as follows:—

				Teeth in swift
10	× 50 ×	46	=	23,000
5	× 52 ×	36	=	9,360
5	× 26 ×	45	=	5,850

				Teeth/min.
23,000 teeth	× 428	r.p.m.	=	9,844,000
23,000 ,,	× 570	,,	=	13,110,000
23,000 ,,	× 750	,,	=	17,250,000
9,360 teeth	× 428	r.p.m.	=	4,006,080
9,360 ,,	× 570	,,	=	5,335,200
9,360 ,,	× 750	,,	=	7,020,000
5,850 teeth	× 428	r.p.m.	=	2,503,800
5,850 ,,	× 570	,,	=	3,334,500
5,850 ,,	× 750	,,	=	4,387,500

				Teeth/sec.
9,844,000 teeth/min.		÷ 60	=	164,066
13,110,000 ,,	,,	÷ 60	=	218,500
17,250,000 ,,	,,	÷ 60	=	287,500
4,006,080 ,,	,,	÷ 60	=	66,768
5,335,200 ,,	,,	÷ 60	=	88,920
7,020,000 ,,	,,	÷ 60	=	117,000
2,503,800 ,,	,,	÷ 60	=	41,730
3,334,500 ,,	,,	÷ 60	=	55,575
4,387,500 ,,	,,	÷ 60	=	73,125

Table 26

With a feed roller diameter of 2¼ ins. and a feed roller speed of 6 r.p.m. it took 44·23 sec. to pull a layer of rags 33 ins. long. Therefore:

				Teeth/sample
164,066 teeth/sec.	× 44	sec.	=	7,218,904
218,500 ,, ,,	× 44	,,	=	9,614,000
287,500 ,, ,,	× 44	,,	=	12,650,000
66,768 ,, ,,	× 44	,,	=	2,937,792
88,920 ,, ,,	× 44	,,	=	3,912,480
117,000 ,, ,,	× 44	,,	=	5,148,000
41,730 ,, ,,	× 44	,,	=	1,836,120
55,575 ,, ,,	× 44	,,	=	2,445,300
73,125 ,, ,,	× 44	,,	=	3,217,500

Table 27

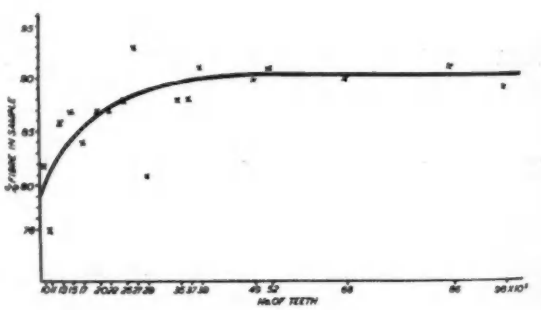
With a feed roller diameter of 2¼ ins. and a feed roller speed of 9 r.p.m. it took 29·49 sec. to pull a layer of rags 33 ins. long. Therefore:

				Teeth/sample
164,066 teeth/sec.	× 30	sec.	=	4,921,980
218,500 ,, ,,	× 30	,,	=	6,555,000
287,500 ,, ,,	× 30	,,	=	8,625,000
66,768 ,, ,,	× 30	,,	=	2,003,040
88,920 ,, ,,	× 30	,,	=	2,667,600
117,000 ,, ,,	× 30	,,	=	3,510,000
41,730 ,, ,,	× 30	,,	=	1,251,900
55,575 ,, ,,	× 30	,,	=	1,667,250
73,125 ,, ,,	× 30	,,	=	2,193,750

Table 28

With a feed roller diameter of 2¼ ins. and a feed roller speed of 16 r.p.m. it took 16·59 sec. to pull a layer of rags 33 ins. long. Therefore:

				Teeth/sample
164,066 teeth/sec.	× 17	sec.	=	2,789,122
218,500 ,, ,,	× 17	,,	=	3,714,500
287,500 ,, ,,	× 17	,,	=	4,887,500
66,768 ,, ,,	× 17	,,	=	1,135,056
88,920 ,, ,,	× 17	,,	=	1,511,640
117,000 ,, ,,	× 17	,,	=	1,989,000
41,730 ,, ,,	× 17	,,	=	709,410
55,575 ,, ,,	× 17	,,	=	944,775
73,125 ,, ,,	× 17	,,	=	1,243,125



Graph 2. Percentage fibre in samples plotted against the number of teeth passing the feed rollers in a given time

Application of "Acrilan" in Knitwear*

In starting any "Acrilan" jersey programme—whether fine or coarse gauge plain fabric—it is imperative to establish the correct yarn count and knitting construction in order to obtain consistent fabric weight off the machine

By H. B. KUROWSKI†

"ACRILAN" can be used in almost any type of knitted fabric or garment, and is being used extensively for the production of jersey fabrics, twin sets, cardigans, heavy knitted outerwear and high pile, fur-like fabrics. Generally, these materials can be knitted from yarns spun on the cotton, worsted and woollen system. Worsted system comprises not only Bradford open and French section, but also the American machinery set-up for worsted spinning. Depending on the weight, handle, and appearance required, yarns spun from regular "Acrilan" of high bulk "Acrilan" are used in the fabrics mentioned above.

Among its many interesting characteristics "Acrilan" has the ability to assume a temporary set which is stable at ordinary temperatures and humidities for prolonged periods. This temporary set is imparted to the filaments by stretching them to a predetermined degree at elevated temperatures and allowing them to cool under tension. This is followed by crimping and *cutting* to the required uniform staple length at the Chemstrand plant. The same type of fibre can be obtained by passing regular "Acrilan" tow of suitable total denier of continuous filament through the "Turbo Stapler" where the tow is heat stretched and *broken* into variable staple which is crimped in top form at this machine. High bulk top of variable staple length is also produced by passing a blend of heat stretched and regular (continuous filament) tow through the Pacific Converter.

In all cases the stretched fibre is of slightly finer denier than the regular fibre of the same nominal denier. Staple fibre obtained by these methods can be processed through ordinary textile equipment without any significant changes in the textile procedures. If, however, this staple fibre is placed in boiling water or a steam chamber, it will shrink to a certain degree depending upon the amount of stretch and temperature under which the stretching was carried out. This fibre, whether in form or loose stock, or variable staple length top, is called high-bulk-shrinking-staple.

To obtain high bulk yarns, these high-bulk-shrinking-fibres are mixed with regular (or relaxed) fibres and spun into yarns. When the spun yarns are subjected to relaxing conditions, the shrinking fibres contract and shorten the entire yarn. The regular, non-shrinking, fibres are bent and puckered in this process and give an effective diameter to the shrunken yarn out of proportion to the increase in denier of the individual high bulk fibres. In this way the volume of the yarn is increased considerably. To use some arbitrary figures: single 20s yarn may, upon shrinking, become a single 16s yarn in weight, but the diameter of this yarn could well be equivalent to a single 12s yarn. This effect, combined with the low density, provides a yarn which possesses additional volume and bulk, thus enabling us to produce warm and soft fabrics without undue weight.

The best results in knitting and fabric dyeing and finishing are obtained from high bulk yarns spun from approximately 35% high bulk "Acrilan" blended with 65% regular or relaxed fibre. This blend of "Acrilan" is used extensively for the production of jersey fabrics. This type of material can be knitted either from cotton spun or worsted spun yarns. Cotton spun yarns are made from 2·5 den. and 3 den. of high bulk and regular fibre respectively. These two deniers of "Acrilan" can be supplied in the U.K. in 1 $\frac{5}{16}$, 2 and 3 ins. staple. Worsted spun yarns require longer fibre, and the most popular staple length in this application is that of 4$\frac{1}{2}$ ins. "square" or variable cut; 3 den. and 5 den. "Acrilan" is used for jersey yarns spun on the worsted system.

Twist is of great importance when considering "Acrilan" knitting yarns. Adequate twist is necessary to prevent the occurrence of fuzzing and incidence of "fly" during knitting, and to minimize fabric pilling in actual wear. Suitable twist is necessary to enable the knitter to produce spiralless fabric and to allow free contraction of high bulk fibres during steaming or dyeing. It is surprising, however, how easily this is done if there is co-operation between spinner and knitter. Consider single 20s cotton spun, high bulk "Acrilan" yarn in which the recommended twist factor is in the order of 2·75. This yarn will shrink approximately 20% on steaming, thus becoming single 16s with the twist of a single 20s. In practice, it is not always possible to allow for this shrinkage by changing the twist factor from 2·7 to 2·3 without detrimental effect on the spinability of a yarn. However, for the same count of yarn a lower twist factor can be used for longer staple and finer denier than for short fibre of coarser denier. In our experiments it has been found possible to spin 1/20s yarn from 3 den. with 2·6 twist factor, and 2·5 den. fibre with 2·5 twist factor, the staple length being 2 ins. in both cases. Level, well-knitted fabrics of pleasant appearance and handle were obtained.

Knitting experiments from which the information included in this paper was obtained involved 1/20s; 1/18s; 2/20s and 2/18s cotton spun yarns and 1/32s; 1/28s; 2/32s; 2/28s worsted spun yarns. Cotton spun 1/20s and 1/18s yarns were knitted into jersey fabric on a 16 gauge, spring needle circular machine and an 18 gauge latch needle machine equipped with web holding sinkers. The 2/20s and 2/18s yarns were knitted on a 10 gauge circular latch needle machine equipped with two sets of needles, i.e., cylinder and dial-producing body panels of 1/1 rib welt and plain knitted fabric. These yarns were spun with various amounts of twist from 3 den. regular staple cut to 1 $\frac{9}{16}$ ins. and 2$\frac{1}{2}$ ins. blended with 2·5 den. 1 $\frac{9}{16}$ ins. and 2$\frac{1}{2}$ ins. high bulk fibre respectively. Knitting was carried out with the object of finding the best construction compatible with attractive handle and appearance in a fabric of a given weight.

Once a suitable construction was found in our experiments, the knitting was repeated with careful control of such factors as the yarn and fabric take-up tension, alignment and levelling of feeders, and control of fabric stiffness, referred to sometimes as knitting quality. For this purpose an instrument called a stitch-o-meter was used. (In this country this instrument designed by HATRA, is known as yarn speed meter.) It was found expedient to count the number of courses per inch in the fabric on the machine under the take-up tension, and to measure, at each feeder, the length of yarn knitted in one stitch. Having found previously the fabric stiffness which gave the desired finished weight per unit length, it was comparatively easy to predict the weight of the finished fabric from the number of courses per inch in the "grey" fabric. Measuring the yarn knitted into this fabric at each feeder gave the assurance that every inch of fabric contained the same amount of yarn. In this way fabric uniformity and weight from one portion to another was checked carefully.

It was found that it was absolutely essential to carry out these measurements, to keep records and if possible fabric samples, in order to ensure successful jersey and sweater fabric production. For high bulk yarns of a given shrinkage, this was the only way to control the bulking of fabric and its finishing to the required specifications. The data in Table I was recorded during production of a commercially successful jersey fabric.

Even this simple set of figures shows that the finer the yarn the more difficult is the fabric weight control due to wider allowable count limits for finer yarns, and finer machine gauges.

With coarser counts and plied yarns knitted on machines of coarse gauges such as 10 n.p.i., with two sets of needles, the choice of suitable fabric construction is

* *From a paper given recently to Nottingham Textile Society.*

† *Technical Service Representative, Chemstrand Ltd.*

complicated by the fact that two structures are being knitted alternately; i.e., 1/1 rib welt and plain fabric. Therefore, to ensure proper rib welt elasticity and extensibility, correct stitch length must be found to ensure proper balance between plain fabric weight and handle, and elastic extensible rib.

With this type of knitting unsymmetric take-up of the fabric should be avoided. Too much pull on one side of the fabric might strain the structure and upset the tension balance. This will manifest itself as distorted panels. It is not customary to determine finished fabric weight, but correct construction and suitable length of panels must be determined to allow for yarn bulking shrinkage. Good results were obtained knitting 2/20s and 2/18s cotton spun yarns to 12 and 10 courses respectively on a 10 gauge, 16 ins. dia. circular latch needle machine.

Another series of knitting experiments involved previously mentioned worsted yarns spun to 1/32s and 1/28s count. Part of each delivery was plied to 2/32s and 2/28s. The high bulk fibres were prepared on the "Turbo Stapler" from 360,000 total den. tow of 3 den. per fil. This tow was broken as follows: the high bulk fibre to 6 ins. variable break, the relaxed fibre to 7 ins. variable break before relaxing. In both cases 1·78 stretch ratio and temperature of 320°F. were employed. "Acrilan" tow treated under these conditions was converted into high bulk top with 18-19% shrinkage. The relaxation of the high bulk "Turbo" top, which forms the non-shrinking component of "Turbo" yarns, was carried out in a "Turbo" relaxer under predetermined and carefully controlled temperature and pressure. The high bulk and relaxed fibre were blended in top form at the gill box in 35/65 proportions and spun on the American system of worsted spinning. The 1/28s and 1/32s yarns were knitted on 11 and 13 gauge interlock machines respectively. The 2/28 yarn was knitted on a 10 gauge, 16 ins. dia. circular machine and the 2/32s yarn was knitted on a fully-fashioned 21 gauge frame. Yarns and fabrics made from "Turbo" treated high bulk staple shrank to a higher degree than the nominal fibre shrinkage.

The initial steps in these experiments were the same as those described in connection with the jersey fabric, but in the case of fully-fashioned garments special attention had to be given to the production of rib welts. Welts, usually 1/1 rib, were knitted separately on flat bed machines. It is known that elasticity and extensibility of rib welts in "Acrilan" garments depend upon their construction as much as the finishing techniques. The garment appearance and dimensional stability are influenced by the correct relationship in the stitch length of the rib welt and the plain body panels produced on the fully-fashioned frames. In order to obtain information concerning this relationship a number of rib welts were knitted on 10, 12 and 14 gauge flat bed machines to the same stitch length and transferred on to a 21 gauge fully-fashioned frame, changing the stitch length of plain fabric from one panel to another. Then a chosen plain fabric construction was made with rib welts knitted to various constructions.

It was found that the best machine gauge relationship between the fully-fashioned frame and flat bed machine is that of 21 and 12 respectively. These findings, including the most suitable stitch length, are tabulated in Table 2.

In addition to fabric construction, due attention should be given to body panel length and width. In the fully-fashioned production, the size of garments is determined during knitting and therefore recording the knitting data and keeping samples of fabric for future reference is strongly recommended. It was also found that fully-fashioned garments shrank to a lesser degree (2-3%) than the knitted tubular fabric length produced from the same yarn.

This was particularly noticeable in comparison with the interlock and plain tubular fabrics made from 1/32s, 1/28s and 2/28s yarn respectively. The data in Table 3 was obtained with the interlock fabrics.

Table 1

System of Yarn Spinning Type of Fibre	Cotton High Bulk "Square" Cut Staple	
Nominal yarn count	1/20s	1/18s
Allowable limits in yarn count	19 - 21	17·1 - 18·9
Twist (t.p.i.)	11·6	11·0
Yarn shrinkage (%)	18 - 19	18 - 19
Machine gauge (n.p.i.)	18	16
Machine diameter (ins.)	24	26
Knitting construction (c.p.i.)	26	24
"Grey" fabric weight (oz./yd.)	4·8 - 4·9	5·8
Finished fabric weight (oz./yd.)	6·0 - 6·1	7·0
Finished fabric width (ins.)	27	27
Fabric shrinkage (%)	18	18

Table 2

System of Yarn Spinning Type of fibre (A-1656 at 1·78 - 320°)	Worsted High Bulk "Turbo" Break
Nominal yarn count	2/32s
Allowable limits in (single) yarn count	30·4 - 33·6
Twist (t.p.i.)	Single 10 - Double 7
Yarn shrinkage (%)	18 - 19
Flat bed (rib welt) machine gauge (n.p.i.)	12
Fully-fashioned frame gauge (n.p.i.)	21
Knitting construction (1 × 1 rib) (c.p.i.)	11 - 12
Knitting construction (plain f/f) (c.p.i.)	14
Fabric shrinkage (%)	21 - 22

Table 3

System of Yarn Spinning Type of fibre (A-1656 at 1·78 - 320°)	Worsted High Bulk "Turbo" Break	
Nominal yarn count	1/32s	1/28s
Allowable limits in yarn count	30·4 - 33·6	26·6 - 29·4
Twist (t.p.i.)	10	9·5
Yarn shrinkage (%)	18 - 19	18 - 19
Interlock machine gauge (n.p.i.)	13	11
Machine diameter (ins.)	30	30
Knitting construction (c.p.i.)	12 - 13	11 - 12
Knitting construction (1 × 1 rib) (c.p.i.)	15 - 16	14
Fabric shrinkage (%)	23 - 25	23 - 25

Dyeing and Finishing

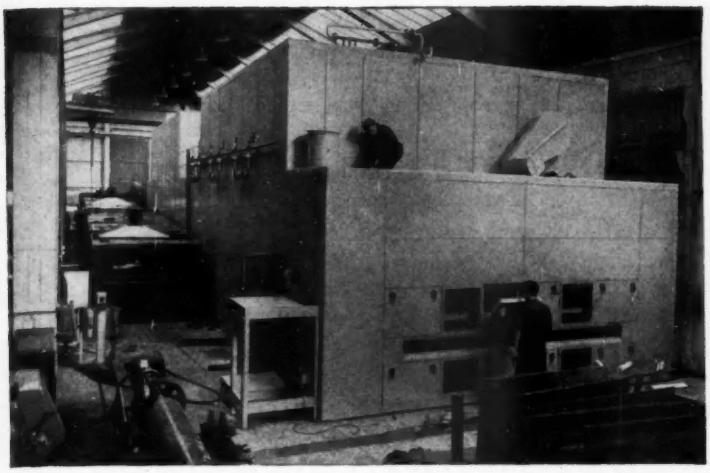
"Acrilan" can be dyed by almost any dyestuff, but, as in the case of all man-made fibres, selection of suitable dyestuffs and methods of application are most important. Jersey fabric, both fine gauge and coarse gauge, can be dyed on winch machines. Light jersey fabric is dried and rolled on the vertical driers equipped with callender rollers. Since the fabric is easily glazed and wrinkled, temperature should be carefully controlled and pressure kept to a minimum. Tubular fabric consisting of rib welts and plain knitted panels is dyed in paddle machines, tumble dried, and then made up into garments. Fully-fashioned body panels are dyed in the paddle dyeing machines and also tumble dried.

It is important to ensure that during tumble drying the temperature is carefully regulated, starting with 120-140°F. and reaching 220°F. in about 15 mins. The goods should be tumbled for 30 mins. at 200-220°F. and then the temperature lowered gradually in 15 to 20 mins. to 120-140°F. The time of treatment may vary according to the handle and appearance desired, but starting the treatment at a low temperature and finishing it at a low temperature is absolutely essential. Although there are differences in processing conditions of certain types of high-bulk "Acrilan" knitwear, once the fabrics are made up into garments all these garments possess one important common property; that is washability under any domestic conditions.

Heavy Weight Fabrics

The regular "Acrilan" staple fibre shrinks in boiling water to approximately 2·5%, and the yarns spun from this fibre will shrink up to 5%, giving a resilient and lively fabric. Heavy knitwear of "fisherman" type fabric can be produced from yarns spun from 3, 5 and 8 den., or blends of these deniers, on the worsted or woollen systems. A suitable worsted yarn for this kind of fabric appears to be 2/18s worsted count consisting of 50% 8 den. 3 ins. fibre blended with 25% 5 den. 3 ins., and 25% 3 den. 4 ins. staple. Standard twist is used in spinning this yarn.

Depending upon the machine gauge, four or three ends of 2/18 yarns are plied and knitted into body panels consisting of 1/1 rib welts and half cardigan stitch portions. It was found that 1/1 rib must be knitted tighter than the half cardigan part to produce welts of correct extensibility and elasticity. If it is possible to set the machine to produce plain circular welts in conjunction with half cardigan bodies, then double plain circular welts are preferred to 1/1 rib construction. In the course of experiments on the evaluation of 2/18s worsted spun yarns consisting of 3, 5 and 8 den. in 25/25/50 proportions, 2½ gauge flat bed machines and 4 gauge circular latch needle machines were used. Four ply yarns were fed to the yarn guide of 2½ gauge machines and 3 ply to the 4 gauge machines. In both cases plain circular fabric gave better welts than the 1/1 rib construction, knitted in conjunction with half-cardigan stitch panels. Either stock dyed fibre or hank dyed yarns can be used.



(Above) A photograph of the dryer under construction. Only a section of this huge machine can be seen in this "shot"

(Right) This picture—taken inside the machine—shows a portion of the mechanism

Large Dryer for Tufted Carpeting

A new 100-ft. long machine has been developed to handle the production of tufted printed carpets

DETAILS of a new textile dryer, claimed to be the largest in the world, were announced by British Tufting Machinery Ltd., Blackburn, at a recent Press conference. It will be installed at the Bradford Dyers' Association works at Prestwich, near Manchester. The dryer is to be used in conjunction with the printing of tufted carpets and is one indication of the bulk production anticipated. It is capable of handling 54 ins. widths but if necessary can be converted at a later date to take up to 12 ft. In principle, the dryer utilises a large motor to suck the water out of the carpet before it is passed through various beaters to raise the pile; the beaters are made of nylon and stainless steel. Lint extractors remove any "fly" that may have accumulated, and a d.c. tension control with spiked tension rollers then comes into play after which the carpet goes forward into the main drying chamber, passing through the machine on a conveyor.

The dryer is a high velocity hot air machine, and on each pass of the interior is an electronic control device. Indeed, it may well be said that the key to the whole arrangement is in the instrumentation devices which ensure accurate control of the entire system through moisture meters and controllers. The machine is 97 ft. long and this does not include the re-roll. Uniformity of drying is very efficiently achieved in that the design employs continuous circulation of hot air. At the Press conference, an official of the company said that not before the first machine had been installed and was working would attention be given to other installations. Because of the economics of the situation, necessitating an extremely high bulk production to recover the initial cost, installations in this country were expected to be comparatively limited, but good overall business was anticipated from overseas.

The idea of a dryer of this nature is, of course, tied up with that of

Mr. S. Shorrock (managing director) and Mr. C. B. Pringle (chairman) British Tufting Machinery Ltd., with a sample of the new printed viscose rayon carpet

printing tufted carpets, and some interesting details were given of a printing machine which has also been developed by British Tufting Machinery Ltd. The first machine is to be a single-colour printer. However it is envisaged that printers of two, three or more colours will be developed. The initial problem of adequate penetration of tufted carpets has been solved and according to an official, now presents no difficulty. World patents, which are pending, naturally do not permit of close details being revealed, but it is said that the secret of the printing is in the roller which is not of the conventional type but made of a plastic material. Problems at one time associated with the "hardening-up" of the carpets as a result of printing pastes have also been overcome. It is possible to "meter" dye without any fear of penetration to the back of the carpet.

An advantage of the system is that a pattern may be changed comparatively inexpensively. Printing although at the moment is 54 ins. is anticipated to be up to 12 ft.

The overall increase in cost of printing is expected, at present rates, to add something of the nature of 3s. 0d. per sq. yd. to the cost of the carpet.

A not *unimportant* feature of the process is that by overlapping and the use of three colours, it will be possible to produce six colours. In printing, daily runs at an average of 16 yds./min. are possible without any difficulty. In the printing machine, two types are available, one designed for the use of Procion (i.e. reactive) dyes, and the other for non-reactive dyes.

Rapid Moisture Tester

THE Schiltknecht precise moisture tester for fibrous, flaky or powdery materials is now being distributed in the U.K. by Engineering and Scientific Equipment Ltd., 33 Minster Road, London, N.W.2. In this instrument the drying oven consists of two parts, the upper section containing an infra-red lamp, and a lower section with an electric heater and a device to accommodate a weighing pan with the test samples and balance coupling levers.

The infra-red lamp is connected to a transformer having a five-step adjustment. Selection of an appropriate adjustment enables the equipment to be set to the highest suitable temperature and to achieve a very quick test result. Weighing of the sample is done on the outer weighing pan and the rotatable dial of the scale can be set to 0% by a pivoted indicator arm.

When the weight of the test sample on the weighing pan attains the pre-required value (10 or 20 g. in accordance with the type of tester used), this is indicated by a small pointer on the scale of the instrument. The weighing pan containing the sample to be tested is placed in the pre-heated oven, and the other weighing pan is removed from the chamber and attached to the outside of the balance in readiness to weigh the next sample. During the drying cycle a jet air pump ventilates the heating chamber and the course of the drying process can be followed up by the rotation of scale. Immediately constant weight is achieved, the ventilating pump is shut off and a reading taken.

The instrument is provided with a reversing lever which changes over the connection with the balance between the weighing pans in the heating chamber or the outer one. Considerable saving in time can be achieved by preparing and weighing a new sample whilst the one in the heating chamber is drying; average time needed for air-dry samples is 3 to 5 mins.

The dials are graduated with two scales which can be chosen from three types of graduation:

(1) Determination of moisture contents expressed in % of wet weight of sample (initial weight of sample before drying is taken as 100%).

(2) Determination of moisture contents expressed in % of dry weight of sample (the weight of the dried sample is taken as 100%).

(3) The actual weight as sample in grammes.

There are five standard types of apparatus each in class (1) and (3), the variation is in accordance with the range of moisture reading required and division of scales.

The Schiltknecht moisture tester

Tweeds and Slipper Cloths

Superbly manufactured and finished, the nine patterns on the facing page are a selection from the fine range of cloths made by Braithwaite and Co. Ltd., Kendal. Brief details of the two classes of cloths are as follows:—

(1) An 18 ozs. coating cloth of fancy hopsack weave in which multi-coloured slubs add a bright random effect on black and white.

(2) A fine example of the traditional hard-wearing Westmorland tweed, which is manufactured entirely from the wool of the local sheep.

(3) A beautiful 22 ozs. lambswool reversible cloth—one side light grey and the other blue/grey.

(4) Dark brown and white yarns are used in this 18 ozs. coating cloth featuring a large star effect.

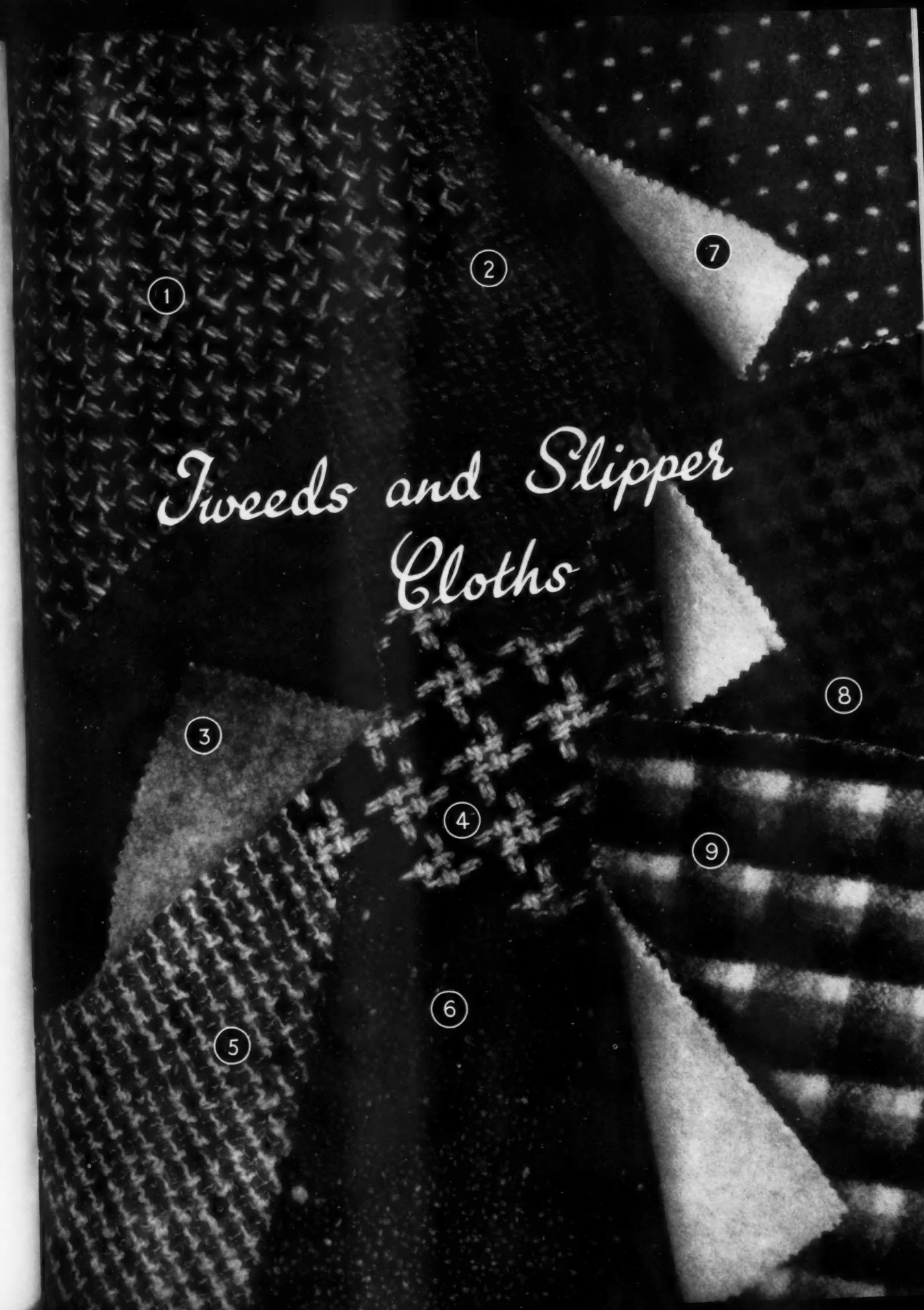
(5) A sparkling effect characterises this 17 ozs. coating made from fancy twist yarns with multi-coloured slubs—white, light blue, crimson, violet, green and fawn produce a remarkable effect.

(6) A 19 ozs. coating cloth made from fancy twist yarns with multi-coloured slubs.

(7) A spot face design—crimson and white—in a slipper cloth.

(8) A block check face design—black and green—in a slipper cloth.

(9) A heavy-weight check faced slipper cloth—cream, white, crimson, fawn and dark brown yarns are employed in the most effective manner.


Tweeds and Slipper Cloths
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correct light for colour matching—£25

For matching dyes, fabrics, pigments or products of any kind where colour enters into the specification, you need a special type of light. But it needn't cost you a lot of money. The Siemens Ediswan Industrial Colour Matching Unit gives you an unvarying source of artificial daylight of high luminous intensity for only £25. The spectral quality of the light from this unit is almost identical with that of natural daylight at a colour temperature of 6500—7000°K. The shaped reflector and 24 x 17½ in. diffusing screen spread the light evenly over the working area and there is a remote control that switches off the fluorescent tubes for matching colours by incandescent light only. The unit is supplied ready to operate directly from the 200/250 volt 50 cycle supply. Total consumption is 220 watts. We will gladly send you a folder describing in detail the unit and its method of use.

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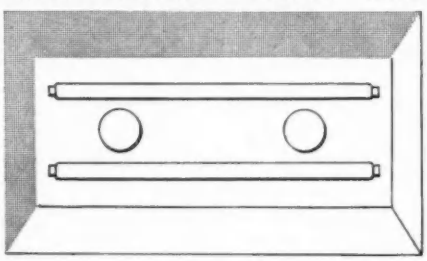


Complete with control gear, lamps (2 filament and 2 blue fluorescent), remote control box and 2 yd. 7 core cable.

PRICE: £25

This price includes Purchase Tax on lamps

CRC PD 11

Order Control—Once Right, Doubly Sure

In a large organisation many departments are concerned with the orders received. Ensuring that instructions are always accurate can be something of a problem and this article describes the system followed by a well-known Lancashire firm

By J. HEATON*

AS with most firms, orders reach us in a wide variety of forms. For our particular class of products these orders may be large, and the instructions complex. The importance of making sure at the outset that an accurate instruction is followed, right through every department, is obvious.

When an order is received, we make out a set of forms pre-loaded with carbon. These sets are made up in such a way that they can be easily typed and the copies quickly separated. Six copies are prepared simultaneously. These copies act as instructions to all the departments concerned with the order, and as they are produced simultaneously, it means that one typing and one check for accuracy only is required (see Fig. 1.) If the top copy is correct all copies are correct. Moreover, as the top copy is sent to the customer as an acknowledgement of his order, and giving an exact description of the goods required etc. we establish complete understanding before the job is put in hand.

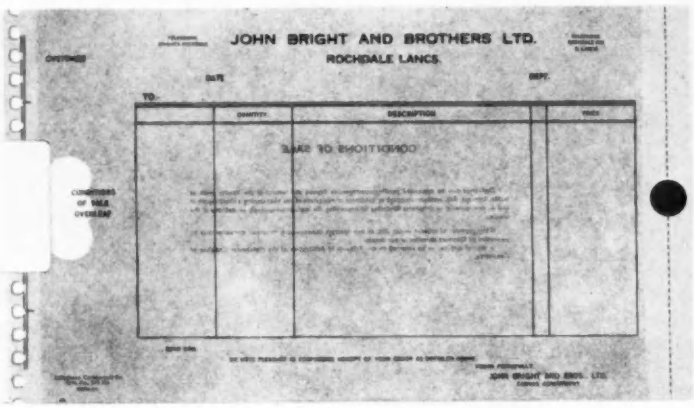


Fig. 2. The set of forms. Each copy is a different colour

An illustration of the set of forms is shown in Fig. 2. Each of the copies retained by us are of a different colour in order to distinguish the various departments and operations for which they are used. These are as follows:—

Copy No. 2–white–Sales order book
Copy No. 3–blue –Sales section
Copy No. 4–green–Planning, making and progress section
Copy No. 5–pink –Warehouse copy
Copy No. 6–buff –Works manager's copy

(The top copy is sent to the customer, as already indicated.)

It will be noticed that the forms are punched with a series of holes down the left-hand side. This is done so that the order copies may be kept in Kalamazoo "Visible" equipment by the departments concerned. This requires a little explanation.

The copies are placed in a loose leaf binder in overlapping sequence so that the bottom edge of each form juts below its neighbour. At each opening of the binder, therefore, the edge of twenty of more orders can be seen. It is the visible edges which carry the customers' name and order number, and our work's order number. It is this "visibility" of many orders on each page opening that speeds the selection of the records, and thus enables reference and entries to be

Fig. 1. If top copy is correct—all copies are correct

* *John Bright and Bros. Ltd.*

Fig. 3. The records in place in the visible binder

Fig. 4. Sales section copies are kept in binders and filed alphabetically

made easily and quickly. The illustration for Fig. 3 shows the records in the visible binder being used. The use to which the various copies are put is as follows:—

Sales Order Copy

This is used for invoicing and acts as a current order book. On the reverse side is a delivery record which is very useful. Some orders may take as long as twelve months to complete, and a record of part deliveries is, therefore, vital.

Sales Section Copy

We find it convenient to have a complete record of all orders, current and delivered filed under the customer's name. By reference to past orders we can often clarify present requirements and make sure that goods and processes are described in standard terms. The sales section copies are used for this purpose. They are kept in transfer binders and filed alphabetically; they can be seen in Fig. 4.

Making Section Copy

This is used by the planning, making and progress department. The reverse side is designed to carry dedetails of the progress of the order through to mill and therefore, to act as a control record. These copies are kept in visible sequence as previously explained. Details of all processes including single yarn control, doubling, beaming, pirnwinding, weaving and finishing are recorded here.

Warehouse Copy

This is the final stage prior to despatch. The warehouse manager is responsible for inspection, and needs to know the order specification of every job.

Works Manager's Copy

In order to plan his production efficiently, the Works Manager must know what orders are coming through. We are able to supply these details by providing this copy of the original order without extra effort.

There seem to be three factors which make for certainty and simplicity in this system of controlling orders.

(1) The production of complete instructions for all departments involves only one operation. Inaccuracies due to the copying of wrong specifications or to mistakes in the transfer of figures from one document to another are avoided. Once we have checked that the original instruction is correct it is impossible for errors to creep in.

(2) The logical design of the forms themselves ensures that they cover the requirements of all departments. The type of set we use also means quick preparation of the original documents.

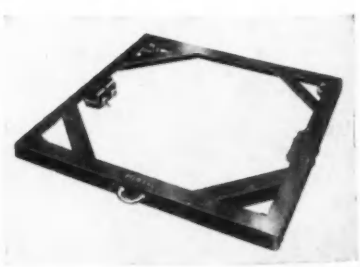
(3) The visible method of keeping the order records makes for speedy reference and greater control.

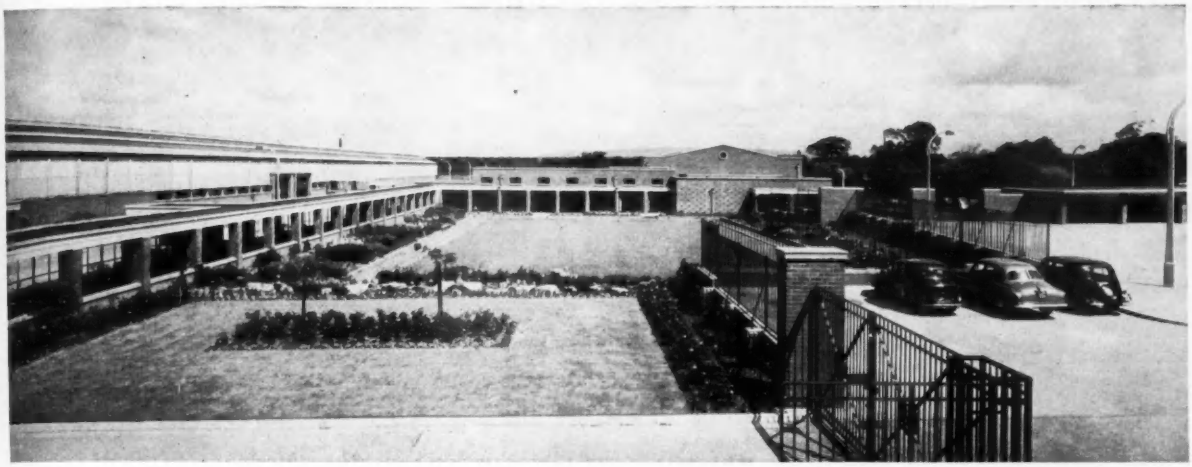
Firms often baulk at new systems ideas, feeling that they will involve elaborate changes, and disorganization. The method described in this short article is a simple, practical one which many firms could adopt without undue difficulty.

New Pallet-Handling Bogie Truck

THIS new device will be of considerable interest to all users of pallets. The makers, Powell and Co., Barry Port, Carms., S. Wales, point out that both empty and loaded pallets up to 4,500 lbs. capacity can be pulled or pushed in any direction on the low-loading framework and can be rotated through 360°, if required, for positioning. Empty pallets can be stacked on the Bogie, then man-handled for storage into corners, lifts, etc. For short distances the bogie can be used to move a loaded pallet by means of a tow-truck, when a fork lift truck is otherwise engaged or where space or headroom is too limited for the fork lift truck to manoeuvre. Towing lugs are providd.

All rollers are of wide tread, machined from solid steel bar and have alloy steel roller bearings. The main running rollers are in pairs and are mounted on a slightly lower plane than the corner rollers so that the bogie can pivot freely if required. The welded steel frame is carefully designed and suitably braced for maximum rigidity. The model illustrated measures 40 × 40 ins. to carry pallets of that popular size. Models for other sized pallets can be designed.





A view of North Block (left) and the main canteen hall of the Hindley Green factory. The newly completed South Block extends to the rear left of this view

Production of Asbestos, etc., Textiles at Hindley Green Works

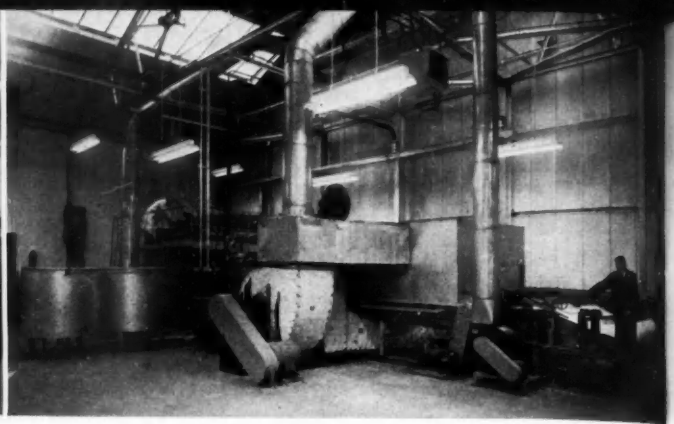
Commenced in 1947, *a* £4,000,000 *development project by Turner Brothers Asbestos Co. Ltd. has now been completed. Covering* 140 *acres and employing* 1,400 *people, the plant is engaged in producing brake lining materials, glass fibre textiles, resinated asbestos moulding materials, transmission and conveyor belting, etc.*

A £4,000,000 development project at Turner Brothers Asbestos Company's factory at Hindley Green near Wigan has now been comcompleted and the final phase of the work was marked by the commencement of production at the south block of the factory. The Hindley Green plant occupies a site of some 140 acres and comprises two distinct factory blocks. The first of these (north block) completed in 1949, is devoted to the manufacture of power transmission and conveyor belting and employs 1,400 people in the works and offices. The new south block is engaged in the manufacture of various asbestos textiles, mainly brake lining materials, glass textiles and resinated asbestos moulding materials.

Asbestos deposits exist in various parts of the world including Africa and Canada, where the Turner and Newall organisation owns important mining properties. The crude asbestos is extracted from ore which, in the initial working of a deposit, is quarried but which subsequently is mined. Numerous processes are involved in the manufacture of asbestos textiles. Briefly, the ore is milled to separate the rock from the asbestos fibres associated with it. These fibres are then subjected to further milling processes, following which they are carded and spun into yarns, in much the same way as cotton, and from these yarns asbestos textiles are produced. The range of asbestos products is processed on conventional type machinery. Tatham's cards are used, and the asbestos generally is blended with a blend of cotton and viscose rayon, but where the resultant fabric has to withstand wet conditions, all-cotton is used in the blend. The percentage of cotton or rayon blend added varies but on the average, for brake linings, etc., some 85% of the product is asbestos, and brass wire is incorporated in the spinning process, which is performed on Tweedales and Smalley frames. Incorporation of brass wire assists in the dissipation of heat in brake linings.

Asbestos Textiles, South Block
After opening, asbestos fibre is fed to these cards, the sliver from which is subsequently spun into yarns for a wide variety of purposes

Asbestos Textiles, South Block
Weaving asbestos brake linings on heavy looms. The fabrics produced are normally up to 25 ins. wide and 1 in. thick, although greater thickness can be woven if necessary



Plastics Reinforcements, South Block
An experimental machine producing chemically bound chopped strand glass fibre mat (Duramat). Completely automatic, it undertakes all processes, from preliminary chopping of glass fibre roving to trimming and rolling the finished mat

Creeling and beaming is conventional except that winding is non-automatic and beaming is on smaller type beams than usual, 36 ins. being an average width. Weaving is at the rate of 85 p.p.m. An interesting development concerns the use of very short staple asbestos fibre, too short to be used for conventional processing. This is impregnated with phenolic resin, and a wide range of end-products is being manufactured and further substantial development is foreseen. End-uses include textile, electrical and other industries. The products are marketed under the name "Durestos".

Asbestos exhibits many important features. It is flameproof and will withstand extremely high temperatures without degradation. It has good resistance to chemicals and excellent tensile strength. Perhaps the most spectacular use of asbestos is as a flameproof material in fire curtains, protective clothing and in various types of fire fighting equipment. But this is only one of a vast number of industrial applications. Asbestos-based packings are used in all kinds of plant in industries ranging from nuclear engineering to oil processing. Asbestos cloths are used for heat insulation, as the basis of brake linings; and on the bowls of laundry calenders. Asbestos tapes have for many years been one of the most important forms of electrical insulation available. The bulk of the asbestos textile production of the company's south block is devoted to brake lining materials. An important customer in this sphere is the associated company, Ferodo Ltd.

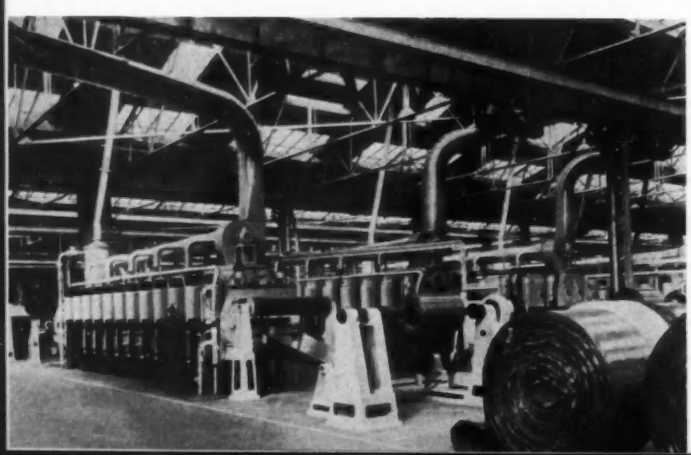
Glass Fibre Materials

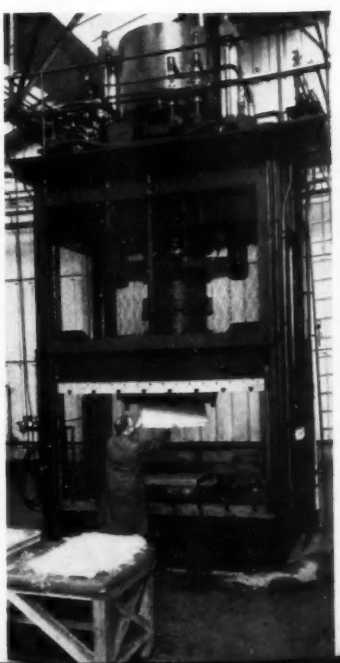
The glass fibre materials manufactured by Turner Bros. Asbestos Co. Ltd., which are marketed under the trade name "Duraglas," are also used in many industrial applications. The physical and chemical properties of "Duraglas" glass fibre are such that fabrics produced from it are incombustible and resistant to most acids and alkalis; its uses include chemical filtration and heat, sound and electrical insulation. One large scale application for it is as a pipe wrapping, where its strength and resistance to corrosion are invaluable.

The glass fibre is cut into lengths of two inch staple, by pressure break, and then polyester resin is added, followed by spraying with water to the extent of 30% water. The resin is heat-fusible, and distribution of the glass fibre is random. Two types of glass laminate are manufactured, one which is formed by chemical compound and one which is bound by mechanical means. The difference is that the mechanically combined is matt whereas the chemically combined is translucent. At present output is in the region of 6 to 8 tons per week, per machine, with two machines working, but a new machine is to be installed shortly and a rapid expansion of this product is planned. Of the machines now in use, one is a "Curlator," made by the Curlator Corporation of Rochester, U.S.A. and another is a Brenner, made by the Brenner Co. of Newark, N.J. This latter machine is the chemically-combining one, and the former, the mechanically-combining.

Probably the most important single use for these glass fibre materials, however, is as plastics reinforcement. Polyester resin, reinforced with "Duraglas" fabrics, is moulded into motor car bodies with smart, elegant lines, caravan bodies, boat hulls, motorcycle side-cars, and many other products, including components for the aircraft industry. Reinforced plastics incorporating these fabrics are simple to mould and mouldings combine great strength with extreme lightness in

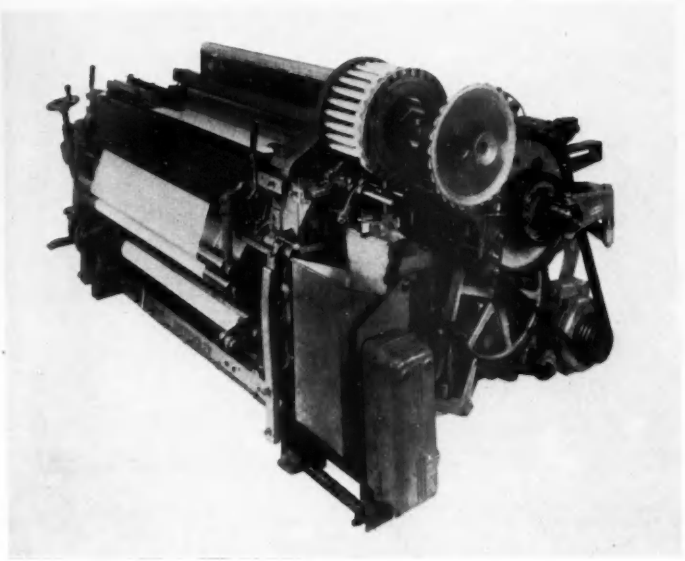
(*continued on page* 190)





(Left) P.C.V. conveyor belting for delivery to the N.C.B. is emerging from a press—a late stage in its production. Right foreground, a roll of belting awaits removal to the trimming section

(Right) Experimental moulding of glass fibre reinforced plastics using chopped strand mat



Front view from the battery side of the Hattersley single shuttle pirn changer designed to run at 200 p.p.m.

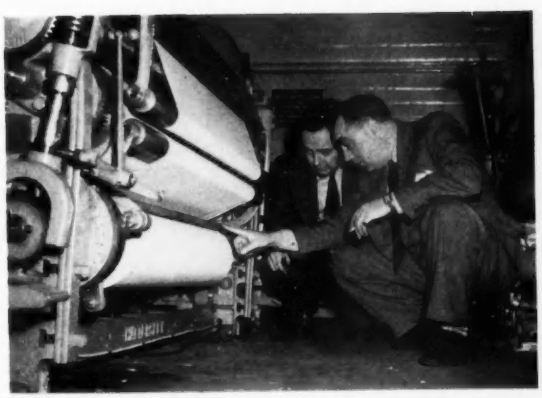
Mr. V. Duxbury (Manchester College of Science and Technology) and Mr. D. H. Smith (George Hattersley and Sons) watching the control mechanism and magnet behind the battery

Hattersley's New Single Shuttle Automatic Loom for Rayon, etc., Cloths

Constructional and operating features of a new streamlined, low built, fast-running model with automatic let-off and vernier-type take-up motion

FULLY maintaining the company's world-wide reputation for efficiency and reliability, the new low-built, precision-made single shuttle automatic pirn changing loom announced by George Hattersley and Sons Ltd., Keighley, has already aroused considerable interest in weaving circles. Convinced from experience that adapted cotton looms are seldom suitable for handling the increasing range and variety of man-made filament fabrics the firm point out that lack of precision in construction of both let-off and take-up motions can cause irregularity in pick-spacing. In addition, inaccuracy of shuttle flight may damage filament and the older types of treading motion are sometimes responsible for oil getting on to the cloth.

These important considerations have received full attention in the design of this new model. Based on the 382 Model range of looms, this latest addition is low-built, the lower centre of gravity permitting higher speeds with reduced vibration. More light is also available over the warp—a feature which facilitates much clearer working conditions in a shed—and the convenience of the weaver has been studied from every angle. Siting of the controls, reversing and shuttle ejecting pedals, swell release handles, etc., all minimise physical effort. Equally important is the fact that the standardised components—machined in jigs—ensure interchangeability and rapid replacement of parts when necessary. The deeply ribbed loom sides are milled flat and a strong cross-braced H-rail provides support for the crank and bottom shaft which, combined with double-footed spur-rail gives an exceptionally robust structure. Strong helically cut pick wheels positioned close to the loom frame on the driving side spread the impact of the pick over four teeth (two top and bottom) resulting in a constant smooth



Inspecting the new anti-crease arrangement—Mr. F. Andrew and Mr. G. Turton, both of British Rayon Research Association

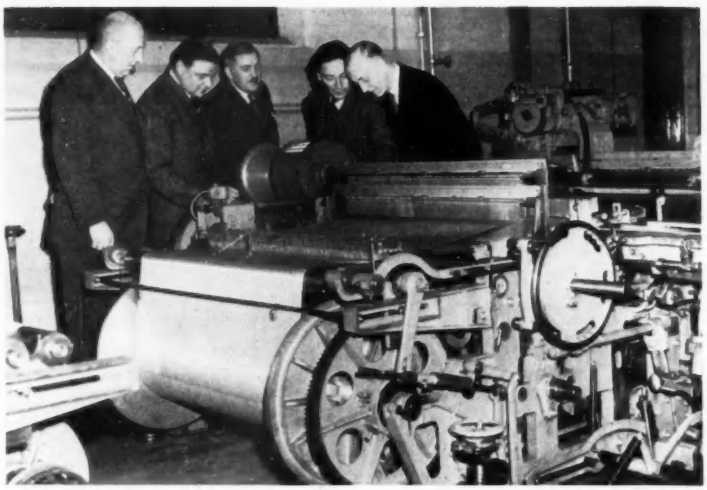
picking operation. Picking is parallel underpick with fixed picker (using a nylon picking bowl), and the absence of a spindle eliminates the possibility of oil being flung into the cloth.

Driven by a 1 h.p., 720 r.p.m. motor to a pulley carrying an internal expanding clutch on the crankshaft the 48 ins. reedspace prototype model runs at 200 p.p.m. The crankshaft is supported in six plain bearings provided with oil wells and is completely covered inside the loom to prevent oil being splashed on to either warp or cloth; when necessary, the shaft is easily removed. Quick operating starting handles are fitted—one at each end—and the brake is instantaneous in action; the pulley being to the loom side reduces strain on the crankshaft. Reversing by power is by a footrail across the loom which, when depressed, releases the brake, disengages the picking, reverses the take-up and runs the loom backwards as many picks as required. These synchronised motions simplify pick-finding and eliminate setting-on places in the cloth.

The new loom is equipped with a vernier-type take-up motion which can be adjusted to weave any number of picks per inch from 5 to 200 without the use of change wheels. A new device—developed by B.R.R.A.—is also incorporated; it is an arrangement which prevents creases forming in the cloth being wound on to the cloth roller. The automatic Bartlett type let-off motion is fitted, with oscillating backrail for plain weave, arranged for 24 ins. dia. beam flange. The back rest can be adjusted over a wide range of positions and vernier epicyclic or a variety of negative motions can be supplied if required.

Positive inside treading takes up to eight shafts plain weave, an arrangement ensuring a perfectly opened shed because the fulcrum of the heald levers is directly below the cloth fell. Adjustments for timing, height of warp and amount of lift are easily made. The heald frames are secured by snap-on connectors which, being unaffected by atmospheric variation, need no further adjustment once set in position.

Alternative shedding arrangements include 10-shaft negative cam box for weaves up to eight picks to the round; non-positive 25-shaft cam dobby with or without paper card mechanism, or jacquard. Pickfinding by hand is performed by de-clutching the dobby drive and engaging a handwheel which gives two turns per pick. The weavers only have to turn the dobby back until the broken pick is found, as each lag is presented whilst the knife is clear of top or bottom hooks—whether turning forwards or backwards.



A view from the back of the loom (left to right) Mr. T. Horsfall (production manager); Mr. P. F. Smith (sales manager, George Hattersley); Dr. F. Happey (head of Textile Dept., Bradford Institute of Technology); Mr. R. Smith (director, George Hattersley); Mr. R. Oversby (deputy head, Textile Dept., Bradford Institute of Technology)

The loom is equipped with TMS model single colour battery made by George Fischer of Schaffhausen, Switzerland, which was specially developed for silk and man-made fibre yarns. Conversion to weft mixing for double picks of single colour, or for crepe weaving, can be made, by fitting the necessary extra parts. The raceboard—adjustable for height to accommodate different thicknesses of covering—is bolted to mild steel angle secured to the slay swords.

The shuttle eye cutter is the adjustable oblique stroke type that put no undue tension on the yarn when gripped; the blades are opened by a cam and closed by the hammer. The weft feeler is a swivel mounted, two prong, electrical type with nylon body and each prong has a lightly sprung insert which does not damage the filaments on the pirn. The mechanism and magnet is mounted in the loom end behind the battery where it is fully visible and free from oil. A simple direct cam and catch linkage operates the pirn change and shuttle protector, when the metal sleeve on the pirn is sufficiently exposed to enable the feeler to close the circuit. A centre weft fork, stop-on-pick motion complete this relatively low-priced, meticulously designed loom.

TURNER'S NEW HINDLEY GREEN PLANT

(*continued from page* 188)

weight. The new south block is producing chemically and mechanically bound non-woven glass fabric mats sold under the trade mark of "Duramat" which have recently been developed specifically for the plastics industry. Glass yarns and rovings, which are the raw materials for these products, are manufactured by an associated company, Glass Fabrics Ltd., Dungannon, Northern Ireland.

Plastics Materials

The third main group of products of the new south block, resinated asbestos thermosetting moulding materials, has the trade name "Durestos." This comprises a range of resinated asbestos felts, flocks and powder, which are moulded into vital parts of guided missiles and into components for the textile, electrical and many other industries. "Durestos" materials produce high strength mouldings which are resistant to heat and most chemicals. Parts of the Avro Vulcan Jet Bomber and other well-known aircraft are produced in this material. For several years, aircraft drop tanks manufactured by Bristol Aircraft Ltd. have been made from "Durestos" materials.

Other Products

In addition to these products, south block will undertake the manufacture of certain allied materials for other Companies in the Turner and Newall organisation in order to obtain the benefits of centralised production.

Preparation of Yarns for Knitting

Abstracts from the four very interesting papers given at the recent one-day conference organised by the Midlands Section of the Textile Institute

Preparation and Knitting of "Orlon" Yarns

THE low density of "Orlon"—giving bulk with little weight—contributed outstanding aesthetic properties to fabric made from it and in processing, adjustment must be made to machinery to allow for this unusual bulk, said Mr. H. Jones (du Pont Co. (United Kingdom) Ltd.,) in his paper to the Textile Institute one-day conference. He pointed out that one of the most outstanding properties of "Orlon" was its ability to be heat stretched and to maintain its unrelaxed condition until specially treated in a hot and moist condition. This property had resulted in the development of the high bulk yarns which had been so successful in knitwear. A high bulk yarn was composed of two groups of fibres, one group having low shrinkage and the other having high shrinkage characteristics. The loft or bulk occurred when the low shrinkage fibres buckled or were pushed away from the centre of the yarn as the high shrinkage fibres contracted.

The properties of "Orlon" acrylic fibre which contributed to its success as a fibre for knitwear also influenced the manner in which it was handled in the preparation of yarns, said Mr. Jones. The most popular attribute of "Orlon" was its handle, which ranged from the softness of silk or cashmere in fine deniers to the resilience and crispness of a crossbred wool in 6 and 10 denier/m.f. A denier of "Orlon" should be selected to give a handle suitable for the garments in which the yarn would be used. While 3 denier "Orlon" was used widely in the production of yarn for the classical twinsets, 6 and 10 den. was more suitable for fisherman's knit garments. Blended yarns of "Orlon" and other fibres also required the selection of a denier and fibre length similar to that of the other fibre in the blend. For example, 1 den. "Orlon" would be used as a blend with Sea Island cotton while 10 den. "Orlon" would be blended with a 48's quality wool and a 3 den. "Orlon" with the finest grades of wool.

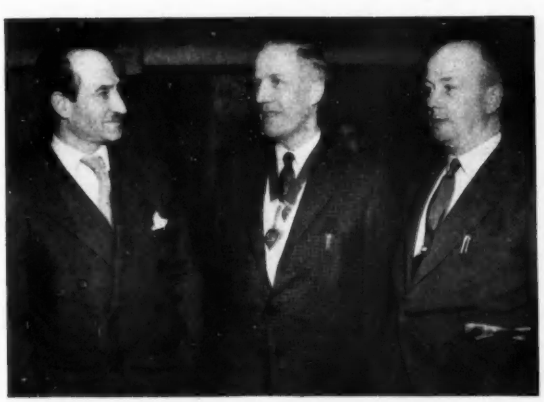
The high shrinkage fibres formed a core around which the other fibres bulk. The usual shrinkage medium for high bulk yarns was water usually at the boil, or steam. Du Pont produced staple fibres tailor-made in lengths to suit all spinning systems in both low and high shrinkage forms. The further method of producing high shrinkage "Orlon" was available by processing "Orlon" tow on the Turbo-Stapler, Pacific Converter or schappe system of spinning. The degree of bulking in a high bulk yarn was governed by the difference in shrinkage between the low shrinkage and high shrinkage component of the blend. Where high or low shrinkage staple fibres were employed this difference was 14%. With the Pacific Converter route it was in the region of 19% and with Turbo processed yarns it was as high as 21%.

The percentage of high shrinkage in the blend was also important to obtain good bulk; 40% high shrinkage was usually sufficient to obtain optimum bulking. With yarn constructed of heavier deniers such as 6 and 10 den. it might be necessary to increase this percentage to 50% in order to get a sufficient number of unrelaxed fibres in the core of the yarn to maintain yarn strength and obtain maximum shrinkage and bulk.

As improvements in quality were introduced into "Orlon" du Pont, the material acquired a new merge number. Since these new merge numbers might indicate increased dyeing affinity, improved whiteness, or greater shrinkage capacity in the fibre it was essential to segregate the materials of different merge numbers through all stages of manufacture through to the finished garments.

The characteristic properties of "Orlon" influenced its behaviour during spinning. "Orlon" staple was cut to various lengths to suit the various systems of spinning. Fibre lengths of 1½ to 2½ ins. were employed on the cotton system and 3 to 9 ins. on the worsted system, and the relative merits of these systems were summarised by Mr. Jones. Generally speaking, he said, French and Bradford systems of spinning had higher labour costs than the cotton system but yarns of greater bulk could be produced on the worsted system by processing tow through the Turbo Stapler or Pacific Converter. Turbo tops presented some difficulties when spun on the Bradford process due to the number of short fibres present. Pacific Converter tops had a more regular fibre length and were more easily processed on the Bradford system. With certain adjustments, however, it was possible to spin yarn from Turbo tops on this system of spinning especially in those mills which had a shortened process.

On the French system, Pacific Converter and Turbo tops could both be processed if fibres were cut or broken down under 5 ins. in length. The main problem here was sliver cohesion in French drawing, but this could be overcome by suitable adjustments to machinery. The American worsted system of spinning had been very successful with Turbo tops due mainly to the control of the short fibres afforded by the pin drafters, long draft roving and the spinning equipment employed. When selecting a yarn of "Orlon" for knitwear it should be remembered that the method of spinning largely determined the properties of the yarn. Turbo processed yarns had maximum bulk and cover due to the number of short fibres in the yarn. Yarn from Pacific Converter tops had less cover but good shrinkage and bulking characteristics. Yarn from staple would be similar in appearance to Pacific Converter yarns but would not shrink or bulk to the same degree.



(Left to right) Mr. A. Slade (B.N.S.); Mr. G. Loasby (director, British Nylon Spinners Ltd.); and Mr. E. Brierley (Thomas Holt Ltd.)

While Turbo processed yarn had found great acceptance in the field of soft classical garments, those yarns with less cover might well be more successful in other types of knitting. In selecting yarns it was important to remember the part denier variation could play in changing the softness or crispness of handle in yarns from all spinning systems. High bulk yarns would bulk in hot, moist conditions such as those existing in dyeing, and when these yarns bulked they would increase in count. If the yarns were relaxed in hank form they would increase in count slightly more than if relaxed in fabric form. A 2/30 w.c. high bulk yarn relaxed in hand would become 2/24 w.c. In fabric form this yarn might relax only to 2/26 w.c.

It was advisable for knitwear manufacturers to check yarn deliveries to ensure that shrinkage and bulking was uniform. Cones should be of even density and all knitting machines and guides kept in a clean condition. If Turbo yarns were employed the machines would require more cleaning than when using yarns spun from staple and fabric should be rolled as it left the knitting machines. When fabrics were knitted from unrelaxed ecru high bulk yarns the fabric would shrink in dyeing 25% to 30% in its length. Where relaxed high bulk yarns were employed it was necessary to knit in size. Relaxed yarns would give a more elastic fabric than could be obtained by relaxing the fabric after knitting. The hot, moist conditions required to relax the fabric caused the stitches to feather and thus reduced its elasticity. Greater elasticity was therefore obtained by hank dyed yarns. Other possibilities were the production of tow dyed yarns giving heather effects and ingrain yarns. Tow dyed yarns could be relaxed after knitting, they gave maximum bulk to the fabric but did not contribute as good elasticity as hank dyed yarns. It was customary to use relaxed yarns on coarse gauge machinery. The bulky type of fisherknit sweater was made in this way using three or four ends of a two-fold relaxed hank dyed high bulk yarn.

T.I. Conference : Midlands Section

Yarn Tension, Friction and Knitting

A SENSITIVE yarn tension meter designed and built at H.A.T.R.A. which enabled draw-off tensions to be measured, was discussed by Mr. T. S Nutting, B.Sc., (Hosiery and Allied Trades' Research Association) during the course of his opening paper at the recent one-day conference entitled "Preparation of Yarns for Knitting" organised by the Midlands Section of the Textile Institute. The average draw-off tensions of a series of cones were measured using the tension meter, he continued, and results showed that within each group there was no trend showing increasing draw-off tension with increasing yarn winding tension. As a result of further work, it was observed that neither article dimensions or knitting tensions were affected by variations in winding tensions. Hence, given an even winding tension, the absolute value of the yarn winding tension was not of importance in relationship to ease of knitting, nor to fabric dimensions.

In connection with yarn preparation, Mr. Nutting said that the frictional properties of yarns were of great importance, however, in relation to the ability of a yarn to be knitted under a desirable range of conditions. The frictional properties of yarns were measured by pulling a yarn around a metal pillar and utilising the yarn tension motor to measure the yarn tension before and after passing the pillar. Measurements obtained had proved a very reliable guide to behaviour of yarns during knitting. One of the aims of waxing and lubrication of yarns was to reduce the coefficient of friction of that yarn. An equally important function should be to produce yarns of similar coefficients of friction.

Lubrication of yarns was not a simple matter, and a considerable amount of work still needed to be done before the subject could be considered complete. In considering changes in frictional properties of yarns brought about by lubrication, Mr. Nutting said that yarns of high frictional properties might result in cut fabrics under certain conditions but it might be that as a result of friction effects the result might not be sufficient to give rise to yarn breakdown but what would happen was that the length of yarn knitted per stitch would decrease and a tight fabric would be knitted. Examples of this were common with dyed yarns, and garments of fabric lengths of different dimensions were produced from yarn nominally identical in all other properties. Similar variations in circular hose lengths might be obtained if yarns of differing frictional properties were knitted at a given machine setting.

The variation of frictional properties of yarns as a cause of variation in fabric dimensions was a real one, went on Mr. Nutting, and this problem could only be overcome by effective control during knitting—particularly in between changes of dyed yarns and between different batches of yarns—and a realistic assessment of lubrication problems. Regarding the inter-relationship of yarn friction and yarn winding, he stated that to produce a satisfactory package the yarn must be above a certain miminum tension during winding. On most commercial winding machines the value was not normally known. Instead a certain number of weights were added to control the yarn during winding, the total weight being decided by experience. This type of yarn tension device made use of the frictional properties of the yarn being wound. Hence, for any given weight applied to the tension device, the actual yarn winding tension would increase as the yarn friction increased, and decrease as the yarn friction decreased. For a given set of winding conditions yarns of high frictional properties would produce the hardest cones. When fabrics were knitted from such cones, a structure tighter than that expected would probably result. This was caused by the high frictional properties of the yarn and not the cone hardness, since it had already been shown that cone hardness did not affect knitted dimensions.

The reduction of "fly" was finally discussed. According to Mr. Nutting, build-up of "fly" on a knitting machine was influenced by three major factors:—

(1) Radius of curvature and sharpness of any object over which the yarn passed. In general, the smaller the radius of curvature and the sharper the object the greater the amount of fly.

(2) The extent to which fibre ends protruded from the yarn. For this reason, a "hairy" yarn would be likely to produce the most fly.

(3) The physical properties of the fibres. Brittle fibres produce more fly than pliable ones.

The first point was obviously dependent upon the mechanical system and lay-out of the machines. Hairiness in a yarn could only be reduced after spinning by singeing off the offending fibre ends or fastening them down to the main body of the yarn. Regarding reduction during lubrication, possible suggestions were that if the protruding fibres were pressed to the main body of the yarn in the presence of a liquid film, then it was conceivable that the capillary attraction between the previously protruding fibres and the main body of the yarn would be sufficient to cause an overall decrease in hairiness. A second method would be to use a lubricant containing a substance which temporarily changed the physical properties of the fibres in that they were easily distorted, and hence those protruding were laid alongside the main body.

From certain considerations, however, it would appear that wax applied in a solid form would not materially affect yarn hairiness or the physical properties of the fibres. On the other hand, the possibility of altering the physical properties of fibres was possible to reduce their brittleness, once again water for hydrophillic fibres being a good example.

The problem of yarn lubrication to achieve optimum conditions for knitting was a complicated matter, and a good deal of thought and extensive experiments should be carried out to ensure that the addition of a given amount of a specified lubricant did in fact produce a yarn of improved knitting qualities, Mr. Nutting concluded.

Recent Aspects of Silicone Water Repellents*

By R. NATTRASS†

ALL silicones whether fluid, resin or rubber state have five basic properties. These are (*a*) good insulation properties, (*b*) high and low temperature stability, (*c*) inertness, (*d*) non-compatibility with organics, (*e*) water repellency. This last property was first used electrically in the application of silicone fluids to glass and ceramic to give high surface resistivity. It could be seen that this property was highly desirable for use on organic materials such as textiles but at first this was impossible due to the high baking temperature, somewhere around 250°C., at that time necessary to cure the silicones into position.

The silicone fluid was modified to make it more reactive and applied to synthetic fibres was found to give highly desirable water repellent properties but in itself was not perfect. In the application to cellulose acetate and nylon, chalking could occur and so further research gave an admixture which reduced this chalking tendency: emulsification gave a material which would be applied by the padding method to synthetic fibres. Emulsifying agents were chosen which were destroyed by heat or which decomposed leaving a hydrophobic residue on the cloth so that a major advantage of silicone greatment—that a fabric which has been silicone proofed requires no after scour was not lost. After padding the cloth was dried and then baked for 5–10 mins. at 150°C.

The general nature of the silicone film so formed has been fairly conclusively established. Aided by the low surface tension of the silicone, each fibre is covered by a polymer which owing to further oxidative polymerisation yields a tightly bonded film. It has not been shown that chemical interaction between the silicone and the substrate takes place though this possibility cannot be overlooked. The film formed is resistant to solvent attack, increases the abrasion resistance and usually imparts a desirable soft handle and enhanced draping qualities to the fabric. The treatment has been found very useful in the application to fabrics used in fashion rain wear and sport wear.

Originally these emulsions had to be made by the finisher himself and it was necessary for him to have special equipment such as a colloid mill or homogeniser to make the suitable emulsion. Unless an emulsion of small particle size and good stability is prepared, unsightly oil spotting of the fabric can arise. Again emulsifying agents are to be chosen so that if desired other finishing agents can be applied in the same bath. Stable emulsions of this type were made available and have been found to have good stability in admixture with crease resist formulations and anti-slip formulations.

The application of a silicone together with a crease resisting resin on rayons and cottons involves the formulation of an external silicone sheath on each fibre, the resin precondensate entering the fibre and polymerizing there in the usual fashion. However, if the best results are to be obtained, careful control of the process is desirable. The water repellency of the finished material may be impaired by the presence of large amounts of surface resin, which interfere with the adequate coverage of the fibres by the silicones. Thus, it is necessary to ensure complete wetting out and careful control of drying and baking schedules. Of equal importance is the possibility of volatile amines being formed as the result of improper application of the one bath finish. For whilst the application of a crease resisting resin alone usually entails a cure of about 2–3 mins. at 140°C., it is essential that silicone be fully cured, which necessitates heating for at least 5 mins. at 150°C. It may thus become necessary in certain cases slightly to modify the existing process so as to minimise the dangers of fishy odours arising. This has been done by excluding ammonium radicals from the urea formaldehyde resin, using soda ash instead of ammonia in the making of the precondensate and using catalysts other than ammonium phosphate, such as magnesium chloride or metallic catalyst.

Application to Wool

In order to make silicones applicable to wool certain modifications were carried out on the silicone with the production of solvent solutions or emulsions. The application of these gave good water repellency to wool with little deterioration of handle but after application the baking schedule was still required. Thus this method was unsuitable for many textile finishers. In spite of obtaining a very good proof, snags did occur. One of them was due to heating at this high temperature—yellowing of the wool could occur and change the shade of the dye stuff. Of the two it was found that application of solvent gave more consistent and better results than the emulsion. The problem in the case of the emulsion was that a catalyst addition is made which carries out a twofold purpose, firstly to destroy the emulsifying agent forming a metal soap and secondly to polymerize the silicone at a lower temperature. In some cases good results were not obtained and this has been put down to the possibility of the catalyst being removed from the sphere of activity by interaction with the wool. This has not been proved but is generally accepted. One rather interesting property which is imparted to wool is that stains can be removed by means of solvent without the usual solvent ringing.

This problem of baking was much to the fore in the minds of our research workers and further work was carried out so that conventional machinery could be used. A stable emulsion was produced which is substantive to wool and could therefore be applied at the dyeing winch or in the scouring dolly. A titanium catalyst was also made available which enabled water repellency to be obtained without resort to heat. The method is: after dyeing ceases of piece dyed material—or after scouring in the case of yarn dyed material—the cloth is thoroughly washed-off. Good washing-off is essential as any residual wetting agents can depreciate the action of the silicone to quite a large extent. It has been found that cationic wetting agents are very hard to remove even if they have been applied during spinning and can play havoc with the resultant water repellency.

Cold water is then added to give a liquor ratio of about 10–1. The pH of the bath is adjusted to about 4·0 to 5·5. This pH range is the one at which the exhaustion on to the wool occurs most rapidly and most efficiently. In the case of carbonised pieces it is sometimes necessary to neutralise the acidity of the cloth as it has been found that running in water for half an hour the pH of the bath may be reduced to below pH 4. The calculated amount of emulsion to give the between 2% and 3% silicone on the cloth, mixed with the requisite catalyst, is then added to the bath, and the cloth is run until the bath becomes clear. As usual in silicone finishing no wash-off is required, the piece being taken from the machine, lightly centrifuged and then tentered. After tentering, slight water repellency is apparent and this develops most rapidly over the first period of seven days, and to a further extent as time goes on. By this application absorptions on the Bundesmann as low as 15% absorption have been obtained. The resultant handle of the cloth is a soft warm handle.

MS 2202

Another interesting application in textiles is the production of what is called a reactive silicone in a solvent solution containing its own catalyst, for tarpaulin. This is interesting the heavy tarpaulin industry although it is interesting also for cotton. On all these fabrics silicones give a durably water repellent and stain resistant finish. Water borne stains like coffee, tea, soft drinks and fruit juices roll off without wetting silicone finished fabrics or can be blotted off with a sponge or cleansing tissue. Oily stains can be removed with household solvent cleaners, and the silicone finish is not removed. The silicone finish is part of the fabric and coats each fibre like a plastic coating. Silicone finished fabrics still breathe therefore and stay cool and comfortable. Silicone finishes feel softer and richer. Silicone finished fabrics are more resilient and more resistant to wrinkling and wear. A silicone finish keeps fabrics new looking longer and may be dry cleaned and washed.

Silicone finished fabrics are not water proof and are not stain proof. Neither are they dirt resistant although they are more easily cleaned; neither are they oil or grease proof. To date silicone finishes are available which make dresses, suits, coats, hats, gloves and furnishings stain resistant and water repellent without any detriment to the handle.

* *From a recent lecture to the Guild of Technical Dyers at Bradford.*

† *Midland Silicones Ltd.*

Textile Research Achievements in 1957*

A brief resume of the most notable developments in the U.S.A., the U.K. and other countries in new types of man-made fibres, processing and spinning, winding, warping, slashing and weaving, dyeing and finishing, fabric construction, also testing methods and equipment

By J. B. GOLDBERG

FOR cotton research alone, the U.S. Dept. of Agriculture Research and Marketing Advisory Committee recommended no less than 150 research projects, many of them directed at basic studies as well as fibre processing, and at the recent Beltwide Cotton Production Conference in Tennessee the government was asked to quadruple cotton research expenditure in 1958 to $72 million. The results of treating cotton fabrics with acrylamide were described in a report published in the Textile Research Journal and a British patent disclosed how cotton strength and wear value could be improved by steeping in selected water-soluble amines. High elongation in cordage fibre was accomplished through caustic and methacrylate chromic chloride treatment, according to a patent issued in April to the Fabric Research Laboratories Inc. Fully acetylated cotton, declared to be superior to earlier developed partially acetylated cotton, was announced as a promising modification under investigation at the Southern Regional Research Laboratory and improved heat endurance of cotton was reported to have been achieved by a treatment with dicyandiamide. Preliminary observations of the effects of nuclear irradiations on cotton yarn showed increased affinity for basic dyes and reduced affinity for direct dyes.

Research on wool continued to be directed toward studies of fibre properties and means of improving them. Several types of ionizing radiation appeared to offer no hope of effecting useful alterations such as new cross-links. Chemical treatments, however, including modification by the application of certain isocyanates, gave promise of reducing wool's solubility in hot acid and alkali and susceptibility to attack by several other chemicals. While the antidote for a shrinking wool market has not yet been created, shrinkproofing processes continued to occupy the efforts of a number of scientists. One technique originating at the U.S.D.A. Western Regional Research Laboratory involved use of a mixture of polyamide and epoxy resins, and a Mount Vernon, N.Y. company suggested treatment with a thio-lactone compound. An Australian journal reported on the effectiveness of a gelatin application hardened with formaldehyde in reducing felting.

Permanent breaking of wool fibre cystine linkages permit setting, according to details of an investigation published last August, and more recently the Australian Commonwealth Scientific and Industrial Research Organization announced a method for imparting permanent pleats to wool fabrics by a simple chemical application before steam pressing. Promising to overcome one of the failings often referred to by proponents of the less vulnerable man-made fibres was means for protecting wool from yellowing revealed in a Dept. of Agriculture patent by soaking in an aqueous solution of dibutyl butane-phosphorate.

Man-Made Fibres

The producers of man-made fibres showed little evidence of retrenching in their research efforts to create new products and improve existing ones. Union Carbide Corporation was said to be experimenting with small lots of continuous filament acrylic yarn. Although the only corn protein fibre in the U.S., Vicara, was rumoured to be on the verge of discontinuing operations, the possibility of another part of the corn, starch, yielding a new fibre was suggested in a research investigation originating at Purdue University. Metallic yarns continue popular and Reynolds Metals Co. offered permanent crimp metallic staple while Dobeckmun disclosed plans to manufacture metallic staple in colours in addition to gold and silver. Details of a synthetic linear polyester fibre from lignin were presented at an A.C.S. meeting by Rayonier Corp. DuPont nylon innovations during the past year included a high tenacity yarn, sold at a slight premium and reputed to possess improved resistance to degradation by sunlight and heat, a new Type 700 tyre yarn, and a special staple modified to make it more compatible with cotton in blends. The addition of only 25% of this nylon staple (Type 420) was found to contribute increased strength, tear-resistance and wear-life, of particular interest in work clothing. Also offered by DuPont later in the year was a full lustre nylon carpet staple yielding tone-on-tone tweed effects in carpeting with a single dyeing operation.

In addition to their regular white rayon carpet staple, American Viscose Corp. started output of solution-dyed 15 den. staple. Directed at uses in fabrics where strength superior to cotton is desired, "Avisco XL" high tenacity staple in finer deniers was test-marketed in limited quantities. Recently "Avicron" was heralded as the new American Viscose Corp. filament yarn engineered for textured carpets. This yarn develops a durable crimp which is activated in the normal wet-finishing operations. Courtaulds (Ala.) added a number of new colours to their existing range of "Coloray" rayon staple and also announced plans to manufacture crimped carpet fibre.

Additions to acetate yarns and fibres were Eastman's high-bulk lofted yarn in a new 360 den. multifilament size and their No. 35 smooth-surface curled filament cross-section heavy denier yarns for carpets, Y-shaped cross-section filament yarns by both Celanese and DuPont and Celanese "Type K" staple for pillows and comforter filling and "HC" high-crimp heat-settable fibre for carpeting. Firestone Plastics Co. made available a new low-pressure polyethylene Velon yarn with superior abrasion and moisture resistance and flex life and just a few weeks ago the U.S. Rubber Co. announced plans to manufacture polyethylene yarn.

Foreign producers of man-made fibres appeared to be equally as prolific as American manufacturers. New cellulosic yarns included a filament boucle rayon yarn, a 12 den. crimped rayon carpet staple, a "super white" acetate and fluorescent solution-dyed acetate, all made by Courtaulds Ltd. In Japan a synthetic fibre was said to have been developed from polyurea and Kurashiki Rayon Co. claimed they had succeeded in making their "Vinylon" polyvinyl alcohol fibre more like wool and suitable for acid dyeing. A German producer designed a high-speed melt-spinning process for acetate, and although Hercules Powder Co. acquired the U.S. patent rights, no plans were revealed for using this process in America. A subsidiary of the German Glanzstoff Co. started production of high tenacity "Duraflox," containing high abrasion resistance with a low swelling factor.

In addition to manufacturing what appear to be conventional polyamide fibres, Russian chemists invented one new synthetic fibre, "Ftorlon" containing fluorine and featuring exceptionally high resistance to nitric and phosphoric acids,

* *From a paper given recently to the American Association for Textile Technology, Inc.*

hydrogen peroxide and sodium hydroxide and another, "Vinitron," based on what was described as a chlorine resin and nitrocellulose. "Luvsan" was identified as a Russian polyester fibre and "Onanth" as a type of nylon. Said to be suitable for replacing wool, two new fibres made from albumin were produced experimentally in Hungary. One, "Erilan" was being made in Poland, the other, "Gizolan," made from albumin and cellulose, was described as an "artificial silk with a woollen character." Although still far from large-scale production, fibres from polypropylene continued to receive widespread attention in this country and abroad.

Among the more interesting patents issued during the past year were one assigned to a Japanese inventor for producing hollow filaments of regenerated cellulose and another to a Japanese rayon company for making cellulose acetate fibres by acetylating cellulose fibres. A British patent disclosed a method for improving the abrasion resistance of synthetic fibres by incorporating in the spinning solution an aerogel of a metal oxide. Johns Manville Corp. obtained a patent covering the thermal modification of acrylontrile filaments by coating with a dispersion of fine silica prior to a heat treatment of about 300°F. American Viscose Corp. was credited with inventing a composite yarn with random disposition of two compositions throughout the cross-section and rayon fibres of reduced water sensitivity.

Fibre and Yarn Processing

Preliminary study by N.C. State College Textile School investigators of the effects of high doffer speeds gave promise of a reduction in card neps, and research workers at Budapest. Technical University confirmed the earlier findings reported from the same American school on a study of the influence of reduced card flat speeds. A similar study directed at determining the effect of speed on flat strip weights, neps and mean fibre length was recorded in a German publication. A new Swedish card clothing featured oval-shaped wire and by clothing the flats in a special two-strip fashion neps were said to be reduced to a marked degree. A new high-speed doffer comb introduced by a Boston engineering company utilised the principle of mechanical resonance to provide for faster removal of the web. A reduction in sliver stretch while being drawn from the doffer into the can was achieved by a plastic roller mounted on a simple bracket secured to the card coiler head. A new drafting element by a Georgia company consisted of a top roll with straight and rigid shaft, and independently revolving cots which withstood heavy loads. Saco-Lowell introduced the "Twinstrand" two-sliver package for their "Versa-Matic" draw frame, supplying two spindles, with a new coiling system allowing sliver withdrawal without entanglement. An 80% reduction in card waste was made possible by the "Turbaire" cleaner device which, replacing the licker-in cover, controls air currents to give more efficient cleaning. Increased yields from various blends, improved yarn quality, higher production and reduced labour and waste were claims made for a new English fettling device consisting of a steel cleaning roller applied to each of the swifts and doffers in a wool card. Platt Bros. "Versatex" draft unit permitted the efficient drafting of short fibres present among longer ones over a range of from 2⅜ to 8 ins.

Shown at the Swiss textile machinery fair were a slubbing frame with a 12 ins. lift and high spindle speed, a cotton ring frame for packages up to 12 ins. and a spinning frame with false twist tube drafting arrangement, ball bearing top rollers and thread suction unit. A Dutch electronic slub catcher was claimed to operate at 99% efficiency at winding speeds of 200 to 1,200 yds./min. compared with 10-15% efficiency provided by conventional mechanical devices. A patented process for spinning without flyers disclosed in a German publication depends on feeding a twistless sliver to the rollers of a vertical drafting system on the spinning machine.

Universal Winding Co. introduced a new method for post-treating false-twisted yarns to give a bulking effect and christened the resultant yarns "Saaba." Another post-treatment technique involving heating crimped yarns to produce a modified bulk or stretch yarn was announced by Deering Milliken Research Corp. U.S. Textile Machine Co. offered a new 60-spindle machine for the manufacture of "Taslan" textured yarn and the Hartford Spinning Co. revealed plans to license their patented crimping method utilizing the name of "Spunized" to identify the processed yarns.

Shirley Institute reported production of a non-torque singles yarn on conventional false twist machinery, permitting the making of sheerer and softer hosiery, with use anticipated in the knitting of the feet of fine denier sheer stretch hosiery for women. Also in England, the Ernest Scragg "Crimp Spin 3" machine for crimping yarns featured great flexibility and was said to be capable of operating in six different ways while early in the year Courtaulds Ltd. announced development of their own "Courtolon" nylon yarn crimping process. The Dutch Enka Co. obtained a British patent on what was described as a method for treating filament yarns by air jet bulking to resemble spun staple yarn.

Warping, Slashing, and Weaving

An improved method for sizing nylon and "Dacron" eliminating the need for over-waxing such yarns was devised by incorporating in water-soluble polymers sizing and lubrication in one step. A novel Japanese high-speed warping-slasher promised less labour and floor space, the ends gathered in sheet form being guided through tensioning arrangement and special leasing reed, then passed through the size box and dried on five 2 ft. dia. steam-heated cylinders.

To provide scientific control of shuttle flight and check it with minimum of wear, H. F. Livermore Corp. introduced the "Strate-Line" shuttle box swell which is flat and applies gradual pressure on the shuttle entering the box. Representative of contributions frequently made by fibre producers is the simple attachment designed by American Viscose Corp. Textile Research Department for the S-6 loom to apply a bonding agent to rayon scrim during weaving. Among original devices created by research workers were a number from Clemson College including an off-centre gear drive for looms, a warp knitting machine using thread guides instead of needles, a 2-for-1 twister, a clip-type loom temple which eliminates bowing, a constant tension warp let-off, and a single and two-pick energy storage pick-motion. Crompton and Knowles new W-3 pick-and-pick automatic or "Papa" loom offered a wider number of box-loom pattern possibilities, eliminating lost time for replenishing weft, affording better blending with less filling waste because of smaller bunches of bobbins and drastically reducing drag-ins.

English developments included the Argus warp stop motion said to virtually eliminate broken and slack ends, an improved "Microsatin" finish temple barrel reducing friction with the cloth and the Meiners "Loom-Lite" to direct light through the reed and into the heddles and aid weavers in drawing in or mending broken ends. An English plastic manufacturer released details of a method for making a bonded carpet at high speed by feeding stock-dyed pile yarn from cheeses and forming loops which were fixed on one side by polyvinyl chloride and a Norwegian inventor patented means for making another type of carpet by bonding yarn to a backing by latex. So-called "shuttleless" looms and other unorthodox weaving machines continued to appear on the horizon and arouse considerable interest. The Italian Waltex weaving machine, disclaiming identity as either a loom or knitting machine became available in England. This device draws yarns from bobbins, board or creel, interlocking them to form fabrics of a looped structure, resembling knitted structures but said to possess more stability. Filling selection is by dobby type cams and pegs and the picks are varied by altering warp tensions.

Dyeing and Finishing

A number of novel methods and machines were introduced for the wet processing of textiles. The Solvay Division of the Allied Chemical and Dye Corp. announced a new activated hydrogen peroxide prebleaching process yielding high brightness, absorbency and dyeability at substantial savings and the Becco ultra-rapid peroxide method was perfected for open-width bleaching of heavy goods. A U.S. patent issued to I.C.I. disclosed details of a multi-stage process for the solvent dewaxing of cotton goods, desizing and partially bleaching by passing the goods through an alkaline solution of a desizing peroxygen bleaching compound, then developing a full bleach by steaming. The German-made "Reactor" machine was introduced for the continuous desizing of cloth in open width, the 4 to 6 sec. dwell time permitting cloth speeds of up to 180,000 yds. in 24 hours. An improved bleaching method for Orlon suggested by the DuPont Company entailed the use of an acid scour combined with the application of a blue tint and a fluorescent white dye at the boil.

Indicative of the continued alertness of American companies to utilize foreign as well as domestic developments was the report of the installation by a New Jersey finisher of the Swedish Svetma pad-roll open-width bleaching and dyeing range. This equipment was reputed to provide improved bleaching with sodium chlorite and to be suitable for desizing as well as continuous dyeing at low temperatures with the fabric heated by infra-red to give superior production rates.

Published reports showed comparatively few outstanding new dyeing techniques originating in the U.S. The successful use of naphthol and sulphur dyestuffs for "Acrilan" and a new screen print method for use of fabrics containing this fibre were announced by Chemstrand Corp. and a unique process for the pattern dyeing of tufted carpets with vat colours was patented. Chemstrand Corp. also offered a dyeing method for "Acrilan"-wool blends, relying on dye-cation complexes to permit solid shade dyeing in times similar to those for 100% wool while Union Carbide Corp. announced means for obtaining colourfast union shades on blends of dynel with wool, fur and silk by use of a new carrier. Apparently similar to the "Procion" dyestuffs of I.C.I. was the line of "Cibracon" dyestuffs by the Ciba Co., superior fastness properties being imparted to cellulosic fibres by forming a permanent chemical bond, and Geigy "Maxilon" basic dyes were claimed to be chemically distinctive and to provide extremely good light fastness with good penetration of acrylic fibres.

Printing without starch by utilizing an inexpensive hydrocarbon solvent, emulsifying agent, stabilizer, alkali carbonate and sodium formaldehyde sulphoxylate was claimed to cost less while yielding superior colour values and brighter shades, according to an article describing an American Cyanamid Co. system. The American method for high-temperature, high-speed dyeing of cellulosic, polyester and acrylic fibres with an organic liquid carrier was revealed in a British patent issued early in the year. Employing the "thermal shock" principle to control the pilling of "Dacron" blend fabrics by heat-setting at high temperatures for short exposure times, the "RH" Heatsetter uses radiant heat applied to both sides of the fabric with temperatures of from 400° to 425°F. reached within 1 to 4 secs.

I.C.I. Ltd. published details of a process for high temperature dyeing of azoic blacks on "Terylene," claiming savings in time, dyestuffs and auxiliaries while imparting good crock-resistance, and the same company introduced a series of "Nylomine" water-soluble dyestuffs for dyeing nylon bright shades. The German Badische Anilin Co. reported a method for yielding streak-free medium and dark dyeings on nylon, with possibilities indicated for the dyeing of "Dacron" without the use of a carrier and a British patent assigned to Courtaulds Ltd. covered a dyeing process in which molten urea was used. More information was released on the British Rayon Research Association's fluid bed process for dyeing textiles, with additional applications noted for heat-setting nylon tyre cord fabrics, drying latex-backed tufted carpeting and singeing spun nylon. The first commercial model was installed in the plant of British Tufting Machinery Co. The use of induced electrical currents passing through fabric during scouring or dyeing was featured in an English dyeing machine with advantages of rapid wetting out, thorough penetration and level dyeing at speeds of 10 yds./min. on nylon and 20 yds./min. on rayon.

Exhibited at the Swiss Fair were a fully automatic printing machine in which screens are drawn down out of a magazine and lowered into position on a rubber-coated cylinder over which the fabric is stretched and an Austrian automatic screen printer utilizing a lacquered bronze belt serving as a runner over adjustable printing tables. The Swiss Heberlein Co. received a British Patent on means for depositing vaporized metals on fabrics to yield permanent fine embossed effects. Dyeing and finishing machinery shown at Hanover Fair included a continuous sodium chlorite bleaching plant, high temperature dyeing machines, electrostatic plate flocking equipment and improved skein dyers.

The popularity of "wash-wear" cotton goods brought on a number of new finishes boasting of freedom from harmful chlorine retention, including "Chlordare," "Keetide," "CMI" and "Eponite 100." Reminiscent of some earlier attempts at combining the new with the old, one converter reported the successful application of a nylon finish to cotton to give it a soft lustrous appearance and minimum ironing characteristics. Aimed at overcoming pilling in sweaters knitted from spun acrylic yarns were a chemical finishing treatment in one instance and at least two non-chemical yarn processing methods. A surface saponification technique for making "Arnel" fabrics static-resistant was developed by the Celanese Corp. and "Fabulized" was the name of a new fabric finish introduced by a Philadelphia concern to give a high degree of moisture absorbency to synthetic fibres normally lacking that property.

In England, Bradford Dyers Association announced a new finish which afforded increased serviceability by combating the causes of premature fabric failure in temperate and tropical climates and an ingenious method of producing designs on nylon and "Terylene" fabrics by disorientation of the fibre molecules by applying heat and pressure before dyeing. Apparently determined to give the customer whatever fabric characteristic is desired, another company introduced a durable finish for "Terylene" or nylon fabric to yield a durable "silk-like" or "cottonized" hand. To restore what is likely to become a lost art, technologists of the future may have to conduct research to finish cotton, silk, rayon or nylon to look and feel like cotton, silk, rayon or nylon.

Developments in Fabrics

Improved high pile "fur-like" fabrics of synthetic fibres helped to retain consumer interest. One of these, identified as Candalon "Wink," presents a subtle striping effect achieved through the incorporation of dark coarse filaments to simulate the guard hairs of animal fur in the base fabric of lighter coloured and finer denier synthetic fibres, while a woven-in "break" provides the appearance of the breaks seen in the pelt-joinings of real fur. The Federal Trade Commission frowned on the advertising of another fur-like pile fabric manufacturer who referred to his product as "pedigreed" and the result of the "superb mating of 'Orlon' and dynel yarns." The armed forces, more concerned with the functional properties rather than fashion appeal, reported that a polyethylene-nylon fibre blend was superior to wolverine fur. In the field of pile fabrics, an unusual method for producing an embossed appearance was patented by Mohasco Industries. A thermoplastic powder is first distributed through the pile of a sewn tufted fabric which is then pressed under a heated embossing roller to depress and bind portions of the pile, yielding carved effects.

British Celanese Ltd. was credited with the invention of a means for coating short cellulose acetate fibres with a water-suspension of very fine silica particles, then electro-depositing them on an adhesive coated fabric to form a pile. Courtaulds Ltd. suggested the use of their "Courlose" sodium carboxymethyl cellulose as a carpet backing, claiming good adhesive properties and no wicking of the size to prevent the pile from opening. Two other British companies collaborated in marketing a carpet underlay which incorporated an electric heating element between two layers of felt to maintain a room temperature of 57°F. to 63°F.

Another development of English origin was a light-weight, wind and water-proof cold weather cloth, "Gannex," based on a construction with "built-in air channels" obtained by "spot-welding" filling to an outer fabric layer, leaving open spaces where the air is trapped. Exceptional ventilating properties were claimed as well as shape-retention with insulating benefits retained even when exposed to heavy rain. Duplan of Canada introduced a "Terylene" fabric combined with silicone rubber to make an improved hospital sheeting, said to have excellent chemical and heat-resistance, durability, seam strength and comfort, readily sterilized by steam autoclaving.

A full-fashioned stocking with a non-bulky, substantially invisible seam to give the seamless look was obtained by knitting a panel with a removable thread, according to a patent assigned to Chadborn-Gotham, Inc. in September. To eliminate wrinkles in hosiery worn with medium and low-heeled shoes, one hosiery maker offered nylons with a right-angle foot construction, and to bar hosiery runs a Missouri inventor incorporated a vinyl chloride-vinyl acetate yarn knit and bonded to the nylon. Almost certain to make every man look at the wearer's legs a New York store displayed, but probably did not sell, a pair of $2,000 nylon stockings adorned with platinum clocks and bedecked with diamonds.

To help golfers keep a cool head, an aluminized nylon fabric was produced as a golf cap material by Minnesota Mining and Manufacturing Co., not unlike the heat-reflective aluminium coated fabrics developed a few years ago to protect industrial workers and fire-fighters. A new type of reinforced felt with the romantic name of "Heartfelt" was introduced by the Felters Co. for use in light-weight apparel. This material has a woven nylon net centre with wool and rayon fibres felted to both sides. Fibreglas, usually identified with curtain, drapery and industrial fabrics, was utilised in a tie lining backing to impart crush-proofing properties. Research workers at the University of Pittsburgh reported glass fabrics already developed to withstand temperatures up to 2,305°F. with work under way to make them resist temperatures above 5,000°F.

Last summer announcement was made of plans to produce a high-strength laminated material called "Papertex," combining a light-weight woven nylon fabric with acrylic resins. It was suggested that this tearproof, non-combustible product was suited for rainwear, ski-jackets, upholstery backing, photographic, map and document papers. Originally designed to replace cotton as covering for ham, a

knitted paper yarn, "Pap-O-Net" made by a Dallas, Texas corporation, was elevated to more distinguished service by being fabricated into a variety of fabrics for men's sport jackets, curtains, draperies and summer handbags.

High-strength, flame-resistant non-woven fabric in thicknesses as low as 1/1000 ins. was said to be in the development stage about a year ago. "Perma-Loft" non-woven nylon batting was a new product of Star Woollen Co., and a non-woven fleece was made abroad by a German machine which consolidated cross-laid webs of any desired weight by chain-stitching. The same technique permitted the production of a new type of felt when small amounts of wool were used for the outer layers. Chemical foams, primarily of the polyurethane type, were produced in commercial quantities last year with their use as garment interlinings offering a threat to the market for bats of various natural and man-made fibres normally used as insulation in certain outerwear. A novel patent for the production of a fabric designed to provide protection against harmful radiation entailed treatment with a water-repellent, fire-retardent and lead salt solution.

Testing Methods and Equipment

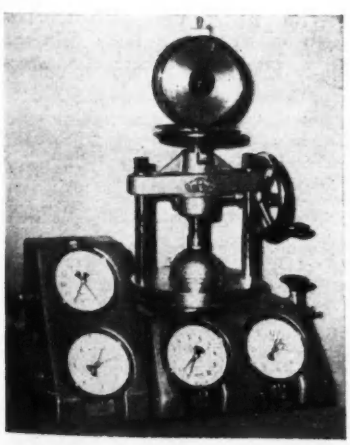
Several new and improved techniques for fibre testing became available. A Boston concern introduced the electronic fibre fineness indicator, a desk-size unit for scanning wool fibres and the British Rayon Research Association developed a new Vibrascope type instrument for measurement of fibre deniers in the range of from 0·4 to 450 den. Discussed at the Textile Session of the Gordon Research conferences last summer was a single fibre testing technique and the relationship of fibre flexing characteristics to abrasion resistance. Design and construction details of an electronic device to measure comparative lustre values of yarns were published. Tenn. Eastman Co. Research Laboratories and the DuPont Textile Fibres Dept. issued communications which gave details of techniques for study of fibre surfaces by use of flattened shadow replicas and the preparation of aluminum replicas. Two instruments for making twist measurements in yarns were developed abroad. One, of Swiss origin, was designed to find the optimum twist in spun yarns without making costly spinning trials. The other, a product of the British Hosiery and Allied Trades Research Association, was an optical device to determine twist in nylon monofilament yarns. Tensitron, Inc. offered a tension meter with an electrical contacting device to flash a warning light if tensions fall below or exceed limits of best running conditions and the Dutch Enka and Breda Rayon Revue carried a description of a new, simply designed tensiometer said to have a high degree of accuracy with its small size and shape permitting use in places of difficult access.

Fabric wear-testing and the correlation of performance in use to laboratory observations continued to occupy the attention of technicians in this country and abroad. Progress reports were issued on further wear test data obtained with the Accelerotor, there being some indication of good reproducible findings on wool and wool-blend fabrics. A new abrasion machine which utilised a cork padded revolving steel cylinder to hold the sample to be abraded was described in Textile Research Journal and details of an instrument for the measurement of carpet thickness during wear appeared in the Textile Institute journal. The DuPont Co. reported development of a method to predict fuzzing and pilling tendency of carpeting by tumbling in an unheated home type clothes dryer along with strips and balls of fabric which serve to abrade the samples. Claims were made for good correlation with actual floor use.

Analysis of fibres, yarns and fabrics for various characteristics was facilitated by the introduction of new instruments and test methods. Designed primarily for the organic chemist, the Infracord double beam spectrophotometer was offered as a low-cost device to check raw material impurities with rapidity. A micro-fusion technique based on melting point was applied to dyed and undyed, bright and dull filament and staple synthetic fibres as a rapid and positive method for their identification. An improved rapid test for the identification of various types of resin finishes entails acid hydrolysis and sodium hydroxide treatment to liberate ammonia.

Notable among foreign contributions in the field of testing instruments and methods were the English "Eel" fluorescent light meter to assess the effectiveness and concentration of fluorescent bleaches, a German battery-operated moisture meter for testing fibre, yarn and fabric with an accuracy of plus or minus 0·3%, a new direct-reading balance for determining yarn counts by the Tex numbering system and a high power microscope small enough to hold in the palm of the hand. Constructed in Germany was a laboratory yarn inspection machine equipped with stop-motion, of use in permitting the tracing of a repeat pattern directly to the machine where a defect originated while an Indian loom-action type yarn abrader was considered of value to relate yarn breakage rates to large-scale weaving. Worsted yarn wet breaking strength tests were found to give an accurate estimate of damage in processing.

Improved Bursting Strength Tester



The Frank bursting strength tester

THE latest model bursting strength tester made by Karl Frank G.m.b.H., Weinheim-Birkenau has been improved by dividing the scale into more measuring ranges. Two additional pressure gauges have been incorporated so that the following measuring ranges can be obtained: 0–1 kg./sq. cm.; 0–6 kg./sq. cm.; 0–10 kg./sq. cm.; 0–30 kg./sq. cm. The gauges are connected in parallel and the 0–1, 0–6 and 0–10 kg./sq. cm. gauges can be switched on or off by operating a valve. The gauge 0–30 kg./sq. cm. serves as a control instrument.

The tester consists of a special sturdily built cast-iron base in which the precision pressure gauges are located. The control and reduction valve is fitted to the right-hand side of the machine. Two strong steel columns connect the base with the crosshead. An interchangeable clamping device is fitted to the bottom of the crosshead and the convexity height gauge is situated at the top. The device for height adjustment is positioned on the right-hand side of the crosshead.

The clamping device serves to press the test specimen against a clamping plate, an operation facilitated by a worm gear. Loosening a fixing device enables the clamp to be very quickly moved. The necessary compressed air may be supplied by a compressor or by a compressed air reservoir. A rubber diaphragm is situated between the clamping plate and the test specimen. At break of test specimen the pressure exerted on the diaphragm is released by a valve. The U.K. agents are H. E. Messmer Ltd., 12 Bateman Buildings, Soho Square, W.1.

Western Germany: Trouser Cloths

The firm of M. J. Emden Söhne Export A. G., Hamburg, Deichstrasse 42, want to contact a U.K. manufacturer of cheap quality trouser cloth including flannel, gabardine and serge. The firm will buy on own account. Established in 1923, they are importers and exporters mainly of piece goods and claim to have connections with the making-up trade throughout Western Germany; a staff of 30 is employed. Manufacturers interested should write direct, also notify the British Consulate-General, 8A Harvestehuder Weg, Hamburg 13.

TEXTILE MACHINERY and MILL EQUIPMENT NEWS

Advances in Continental System Drawing

Only three drawing operations are employed in this new system and the yarn produced is stated to be equal in levelness to that from conventional multi-operational sets

IT is the constant endeavour of all worsted spinners to lower production costs of yarns without sacrificing quality and one of the most expensive items is undoubtedly labour costs. If labour requirements can be reduced, then an important step has been taken towards lower costs. To reduce the number of operatives required demands a reduction in the number of processes. When abridged systems are used, yarn quality must also be carefully watched and in this connection a new system of drawing has been developed by Prince-Smith and Stells Ltd., Keighley which enables yarn quality to be maintained with a minimum number of operations.

This is only made possible by the use of two Raper "Autoleveller" operations. The machines used in this shortened system of worsted drawing have been developed for dry-combed tops or tops containing less than 2% of pure oil, or blends of wool with man-made fibres. Only three operations of drawing are employed and results show that the yarn produced is equal in levelness to the product of conventional multi-operation sets. A further pleasing feature is the possibility of replacing older machinery in stages as and when the necessary financial resources are available. The machines used are:—

(1) Raper "Autoleveller" Speed-o-Gill, Model KSG.4.
(2) Raper "Autoleveller" bicoiler draw box, Model KRD.2.
(3) MS.2 cone reducer with "Versatex" apron high draft.

For the first operation the Raper "Autoleveller" Speed-o-Gill, Model KSG.4 is employed. This is a high production intersecting gill incorporating the Raper "Autoleveller" and operating at faller speeds up to 1,000 drops/min. The usual size of coiler can into which the sliver is delivered is 900×600 mm. and will hold up to 20 kg. of wool. A larger size can is also supplied, 900×760 mm. which has a holding capacity of 40 kg. The pitch of the working screws is 7·94 mm. so that the machine when operating at 1,000 faller drops/min. has a feed speed of 7·94 metres.

The delivery speed of the machine is usually betewen 60 and 70 metres/min. according to the draft employed. This depends of course, entirely on the material being processed, the draft range being from 6 to 12. The sliver weight delivered can be up to 35 grams/metre on 100% wool; thus, a simple calculation will indicate that the machine is capable of a high output. To take a typical example, with a front roller delivery of 63·5 metres/min. producing a sliver weighing 30 grams/metre at 75% efficiency, the productive capacity is 85 kg. per hour. The Raper "Autoleveller" incorporated in this machine automatically corrects all irregularities of feed weight, within the extreme of ±15% (i.e. a range of 30%). The variation of the weight of sliver delivered by the front roller, after Raper "Autolevelling" is within ±1% based on a length of sliver of 5 metres.

The Speed-o-Gill is characterised by rigidity of construction and ease of operation. The built-in driving motor is controlled by "stop-start-inch" push buttons at positions convenient to the operator. Full use is made of electrical detectors in case of breakages of slivers at the front. Electric sliver detectors can also be applied at the feed if required. An electrical stop motion operates when the predetermined length of sliver has been delivered into a coiler can. Static eliminators

Fig. 1. Raper "Autoleveller Speed-o-Gill Model KSG.4

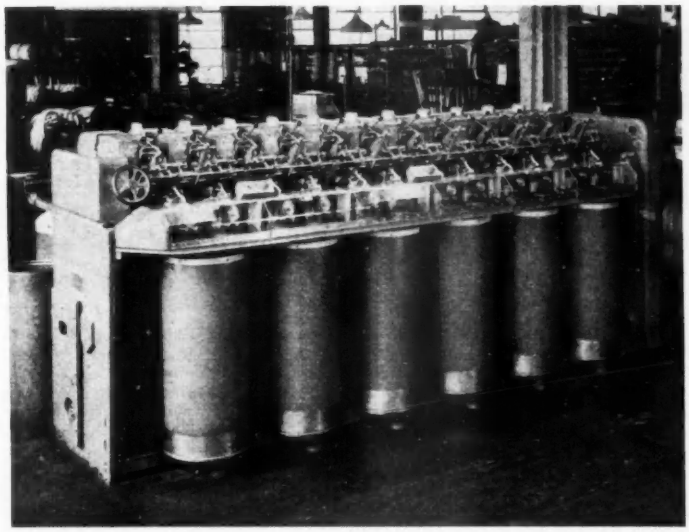


Fig. 2. Raper "Autoleveller" bicoiler draw box Model KRD.2

can also be fitted on request. In the triple front roller unit, the top roller is covered with special synthetic coverings, which also tends to reduce static electricity.

The sliver levelness attained by the Raper "Autoleveller" Speed-o-Gill, which safeguards the spinner against irregularities in the tops, is maintained at the next Raper "Autolevelling" operation, the Raper "Autoleveller" bicoiler draw box. The sliver produced is free from long term variation and the number of processes can be reduced with complete safety.

Bicoiler Draw Box, Model KRD.2

This is a unique machine made in either 4, 6, 8, 10, 12 or 14 heads (usually 10 or 12), each of which incorporates a Raper "Autoleveller" and a Raper pressure drafter. At the bicoiler draw box the Raper "Autoleveller" is able to correct automatioally, irregularities or feed weight within extremes of $\pm 25\%$ (i.e. a range cf 50%). Although the sliver variations in the second operation do not occur to this high degree, the wide regulating range enables different weights of sliver to be fed in, without having to resort to the adjustment of each individual "Autoleveller" unit when different weights of sliver are dealt with.

It is the speed of the measuring rollers acting as feed rollers which is varied to produce the "Autolevelling" effect. The maximum feed speed of this machine is 6 metres/min. The front roller delivery is equal to the rate of input multiplied by the draft employed. The variation of the weight of sliver delivered by the front roller, after Raper "Autolevelling," is within $\pm 1\%$ based on a length of 10 metres. The Raper pressure drafter is the principal method of controlling the sliver being drafted and the pressure drafter units fitted in the bicoiler draw box have three point control.

To further assist fibre control a driven, flanged carrier roller is positioned between the measuring rollers and pressure drafter unit. Since fallers are entirely dispensed with the costs of operating the machine are low. The machine also has a high rate of production and this, consistent with sliver levelness, although the bicoiler is fed by one sliver only per unit. Rules have been worked out for maximum draft and pressure drafter settings, which reduce guesswork to a minimum when starting on a different quality.

The slivers are delivered into reversing coiler cans; each can contains two slivers, hence the term "bicoiler." The can dimensions are 900×400 mm. and each holds approximately 9 kg. The ratch is fixed at 196 mm. Pressure drafting calls for tops within specified minimum limits in regard to fibre length. In practice this is not usually a limiting factor but for good results the makers recommend that the fibre diagram conforms to the minimum requirements as shown in Fig. 5. Longer fibred material up to the length governed by the ratch, process equally well. Drafts of 6 to 10 are possible though in practice drafts of 8 are seldom exceeded. The ingoing sliver weight may be from 20 to 35 grams/metre, with an output sliver weight of 2·75 to 5 grams/metre.

The Raper "Autoleveller" Speed-o-Gill and "Autoleveller" bicoiler draw box form the basis for the new Continental system. These two machines will replace the earlier operations of a conventional set of Continental drawing and can be followed by existing faller drawing and porcupine machines, to produce a rubbed, twistless roving in four or five operations. For the shortest possible arrangement, however, the Raper "Autoleveller" bicoiler draw box is followed by the MS.2 cone reducer with "Versatex" apron drafting to give a total of only three drawing processes.

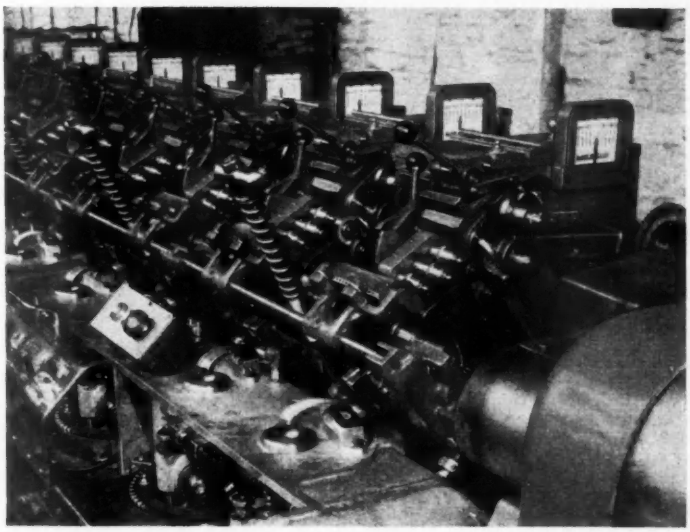


Fig. 3. Drafting zone and coiler head; Raper "Autoleveller" bicoiler draw box Model KRD.2

Table 1

Machine	Doublings	Draft	Sliver weight in Grams/Metre
Raper "Autoleveller" Speed-o-Gill	12	8	30
10 head "Autoleveller" pressure drafter bicoiler draw box	1	7·5	4
3 × 84 Spindle MS.2 cone reducers with apron high draft	1	12	0·33 (3s metric)

The MS.2 cone reducer with "Versatex" apron drafting (single apron), is a modern cone machine giving exact control of draft and producing a roving with accurate soft twist. Each spindle is fed with one sliver from a bicoiler can; thus each can feeds two spindles. The MS.2 cone reducer is an excellent example of the best engineering practice and the machine incorporates built-in motor with V-belt drive, one shot lubrication, fibre wheels to ensure quiet running; helical gears for bobbin and spindle drive and electrical sliver detectors at the feed, if required.

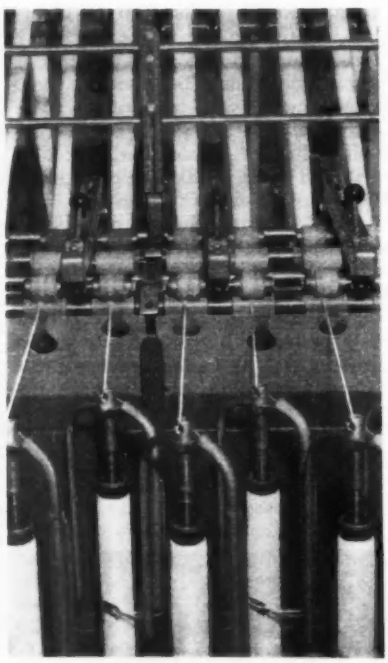


Fig. 4. Drafting zone of the MS.2 cone reducer

The operative requirements for an abridged drawing set composed of the three machines above described are few. One operative can easily attend the Raper "Autoleveller" Speed-o-Gill and the "Autoleveller" bicoiler pressure drafter draw box. Two operatives can easily attend the MS.2 cone reducers and considerable floor space is saved by changing from older machines to the new method.

In shortened drawing sets, such as the above, pre-mixing is required if it is necessary to blend different classes of materials or colours. A typical arrangement of drafts and doublings appears in Table 1.

The rovings so produced are suitable for spinning to 1/48s metric with a spinning draft of 16 (twist 600 turns per metre). The high draft arrangement at the final operation in drawing and also in spinning permit a wide count range to be covered.

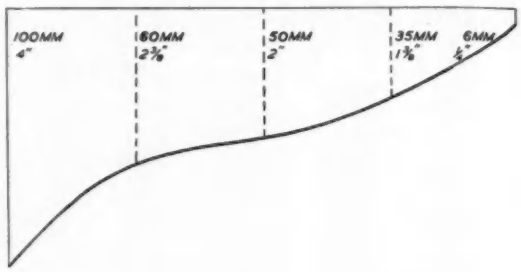


Fig. 5. Raper continental bicoiler draw box Model KRD.2 Diagram showing recommended minimum fibre length

Levelness Results

In order that spinners may compare the levelness of the slivers and rovings produced by the new short method of drawing with the product of conventional drawing machines, the following examples of "Uster" figures appear in Table 2. These have been taken from a wide variety of materials both as bulk lots going through the mills in normal routine production, and from trial lots to test the capabilities of this combination. In all cases, the results compare favourably with levelness figures obtained from the usual multi-operation drawing machines. It is frequently possible to obtain improved figures by finding the best settings for the material being processed.

Table 2

Raper "Autoleveller" Speed-o-Gill

Quality	Grams/ Metre	Average U %
8 to 10 months Cape wool and 70s (blend)	24·3–19·5	2·8
66s	34·0–29·0	1·3
64s	30·0–19·5	2·05
62s–56s	25·7–19·5	2·09

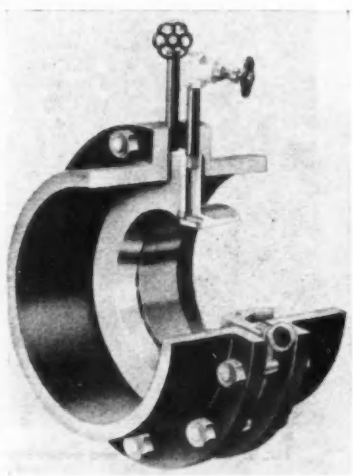
Raper "Autoleveller" Pressure Drafter Bicoiler Draw Box

Quality	Grams/ Metre	Average U %
8 to 10 months Cape wool and 70s (blend)	3·4–2·9	2·75
66s	5·3–3·9	2·30
64s	4·3–2·4	2·7
62s–56s	3·9–2·9	2·6

MS.2 Cone Reducer with Apron High Draft

Quality	Grams/ Metre	Average U %
66s	0·43–0·39	5·4
64s	0·63–0·24	5·4

Pressure Producing Devices



(right) A sectioned view of the Dall orifice

DALL ORIFICE. George Kent Ltd., Luton, Bedfordshire, England, announce the introduction of the *Dall* orifice, the latest addition to their range of differential-pressure producing devices, it is intermediate both in pressure loss and in cost between the square-edged orifice plate and the Dall tube, and is thus particularly suitable for use where pressure recovery is of importance but space or first cost precludes the use of a Dall tube.

These orifices are at present available for 6 in. to 24 in. pipes, and are normally cast in gun-metal, but high-grade cast-iron can be used for some applications on 18 in. and larger sizes.

Beam Truck has Rotating Table and Side Movement

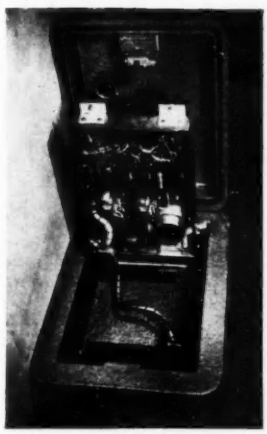
Universal truck with warp beam platform

LIFTING and positioning a full beam into its stands behind the loom has never been an easy job to perform manually. Varying considerably in size and weight, the beams often present difficult problems, more particularly in congested sheds, and the work of replacement is always attended by risk of danger to yarn or accidents to operatives. Specially designed to eliminate these hazards and to carry out the operation in a very efficient manner a hydraulic lifting truck (marketed in the U.K. and the Commonwealth by G. Hunter (London) Ltd., 80 Fenchurch Street, London, E.C.3) is equipped with a lifting platform shaped to prevent damage to yarn whilst carrying the beams in a horizontal position. The truck has a loading height of 8 ins. and lifts to the height required for fitting and also for removal of the beams. The truck will handle warp beams from 16 ins. to 31½ ins. dia. Capable of swivelling through 360°, the platform will move laterally a maximum of 6 ins. to either side on a swinging arm. When manoeuvring in alleys the beam can be swung out into any position and then rotated, thus obviating difficulties of restricted space. The general idea is that one operator will be able to change the looms and remove the empty beams as required.

The truck is sturdily built on a low chassis, it has solid rubber tyres on double row ball-bearings, two of which fully castor so that the truck is extraordinarily mobile. The hydraulic system, with a pivoting foot lever may be operated from the front of either side of the truck. The self locking release valve may be operated by a foot lever from either side of the truck and gives a controlled lowering speed. The oil reservoir is equipped with a magnet which traps any abrasive metal particles. In the standard type model UHK, the lift platform may be swivelled through 360° (lock for straight position) and moved laterally a maximum of 6 ins. to either side on a swing arm (lock for straight position). The effective lift is 27½ ins. and the lowered height 19½ ins. but extensions for higher lifts are available.

(left) The SA1 smoke alarm

(right) The MF2 smoke density indicator



Smoke Alarms and Smoke Meters

OF considerable interest in view of the recent announcement by the Minister of Housing and Local Government on the question of emission of dark smoke from factory, etc., chimneys, new versions of the smoke density meters made by A. M. Lock and Co. Ltd., Prudential Buildings, 79 Union Street, Oldham, will assist all types of industries in tackling the twin problems of dark smoke and fuel wastage. The Type SA1 smoke alarm, suitable for chimneys up to 10 ft. dia., gives an alarm when the smoke passing up the stack exceeds a preset amount. Housed in a robust, dust tight, cast aluminium case the control unit can be mounted up to 100 ft. from the light projector and receiver units mounted on the stack in weatherproof housings. Two alarm recorders are available, a spring driven model with a chart lasting 24 hours, and an electrically powered one in which the chart lasts seven days.

The MF2 smoke density indicator provides for remote indication and recording of smoke density, as well as an alarm when "dark smoke" is emitted. New features include a completely interchangeable plug-in electronic chassis in the control unit, and a robust easily accessible terminal connection panel. Careful mechanical design of the firm's new stack units has even further reduced effects of dust and soot deposits and an ingenious double hinge arrangement allows easy access to the lamp, photocell and lenses. These two instruments built to relevant British Standards specification cover the needs of small and large chimneys and enable the requirements of the Clean Air Act to be complied with in an economical manner.

South Africa and Rhodesias: Textiles

Mr. F. E. Firth (managing director), Hill and Everitt (Pty) Ltd., P.O. Box 732, Cape Town, intends to be in the U.K. from April 4 to May 30. He will be looking for agencies for manufacturers of soft furnishings, shirtings and woollen piece goods for the ladies' clothing trade, also dress materials, preferably printed cottons. The company would act as indent agents but, should a worthwhile opportunity arise, they would consider carrying stocks. Hill and Everitt (Pty) Ltd. are manufacturers representatives and have branch offices at Johannesburg, Durban, Port Elizabeth, and Bulawayo and cover the whole of the Union and the Rhodesias. Manufacturers interested should write direct.

Western Germany: Kashmir Yarn

The firm of Hermann Steger, Nuernberg, Volker-Coiter-Strasse 3, would like to contact a manufacturer of carded Kashmir yarn; they are not interested in knitting wool. Founded in 1919, they are concerned with trade in wool, yarns and similar articles and claim to be able to cover the whole of federal Germany. Manufacturers interested should write direct, also notify the British Consulate-General, Akademiestrasse 7-9, Munich.

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THE TEXTILE
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Recent Developments in Dyeing Textiles

Some details of an accelerated dyeing process in which two typical dyeing procedures are given, also recent developments in pigment printing processes. The dyeing and printing of acetate and polyester fibres is also discussed

By B. C. M. DORSET

A LARGE number of improvements in colouring all kinds of textile materials were introduced during the past year and some of them were not only significant because of certain technical advantages which they allowed in dyeing and printing processes but also because they were based on new ideas which are likely to stimulate further discoveries in this same field. In this article it is proposed to deal with a selection of some of these improvements which appear to have special merit.

An Accelerated Dyeing Process

It is well known that by applying dyes to practically all fibres at temperatures exceeding 100°C. it is possible to accelerate dye absorption so that a dyeing operation normally occupying one or perhaps two hours is achieved within a few minutes. These high temperature dyeing conditions can also ensure a more even distribution of dye within the fibres so that the resulting shades have increased fastness to light and washing. This knowledge has so far been applied more particularly to dyeing synthetic fibres such as nylon and "Terylene," not so much to accelerate the dyeing operation as to ensure the production of deep shades which cannot be conveniently obtained at temperatures below 100°C. There appears to be no reason, however, why such advantages cannot be secured in dyeing other fibres such as cotton and wool by the same expedient unless it be that dyers are loth to use the special dyeing apparatus required. Such apparatus must be the "closed" type capable of withstanding the higher pressures developed within.

Recently progress towards the use of higher dyeing temperatures has been made in a somewhat simpler fashion, i.e., without requiring the use of high temperature "closed" dyeing equipment. It has been found (B.P.784,394) that satisfactory dyeing of fabrics can be obtained by first impregnating with a dye solution, then drying, and finally subjecting the fabric to a temperature of 160 to 235°C. for about 3 mins. during which time the material absorbs the dye in the presence of an amount of water vapour which steadily diminishes to zero. Obviously the high temperature employed must be below that which could cause any adverse effect on the fabric treated. It is believed that such dyeing conditions approximate to those which characterise high temperature, high pressure dyeing in closed dyeing machines, in so far as the internal structure of the fibres is temporarily loosened to allow more complete and rapid dye absorption. Certainly by such rapid high temperature dyeing, "Terylene" materials can be dyed to produce deeper shades than is ordinarily possible.

This new process has been used for applying various types of dyes to a wide range of textile materials and it is capable of application to mixture fabrics, e.g., fabrics containing cotton, nylon, and "Terylene" stripes so that if the padding liquor contains the appropriate dyes for these different fibres then after the high temperature treatment and washing it will be found that the stripes will be differently coloured according to the dyes used. Two typical dyeing procedures may be cited to show how this new process can be carried out. In the first, which has for its object the colouring of "Terylene" fabric in a deep gold colour, a padding liquor is prepared to contain

½% of Solacet Fast Orange 2GKS.
1% of ammonium thiocyanate (to assist dye absorption).
2% of a thickening agent, such as ammonium polymethacrylate (to hinder uneven dye migration during the drying stage).
1% of a wetting agent, such as sodium lauryl sulphate.

The "Terylene" fabric is impregnated with this liquor and then hot air stentered when it is held taut and not free to contract at a rate such that it is exposed to a temperature of 220°C. for 3 mins. Thereafter the fabric is well washed in a soap liquor to remove any extraneous dye not absorbed. It may be observed that as the wet impregnated fabric passes along the stenter frame it is surrounded with a humid atmosphere for the first 2 mins., but during the last minute of travel it is substantially bone dry.

In the second procedure to secure yellow, red and blue stripes in a fabric suitably constructed with wool,

viscose rayon, and "Terylene" yarns, the padding liquor is prepared to contain

1% of Serisol Yellow 5GD (for the "Terylene").
1% of Croceine Scarlet 3BS (for the wool).
1% of Durazol Fast Blue 3RS (for the rayon).
1% of ammonium thiocyanate (to assist dye absorption).
1% of sodium chloride (to assist dye absorption).
1% of a wetting agent, such as sodium lauryl sulphate.

The impregnated fabric is then passed downwards at the rate of 4 yds./min. through a tube heated to provide an initial hot zone at 210°C. and finally another hot zone at 180°C. After such treatment and a final hot soaping, the fabric is left with the desired three-colour stripes. Of course, such a dyeing procedure is not free from certain limitations. For example, if the temperature of heating is too high then the material may be weakened. Further, some dyes are not sufficiently stable to withstand the high temperatures used. Some disperse dyes do not satisfactorily become absorbed by nylon but generally the loose colour may be completely removed by a bleaching treatment. However the process can be used to dye "Orlon 81" goods.

Improved Binder for Pigment Printing

Present interest in pigment printing processes arises mainly from the improved coloured patterns obtained by the use of synthetic rather than natural binding agents. The former are more efficient, so that faster-to-washing colourings can be secured without material stiffening of the fabric and they also have advantages associated with maintaining a satisfactory viscosity of the printing paste. At first attention was largely directed towards the use of urea-formaldehyde resins as binders but more recently other polymeric substances have been found superior. Reference may thus be made to B.P. 784,946 in which is described a pigment printing process which makes use of selected vinyl or divinyl polymers together with a basic polyurea or other high molecular weight basic compound and also another basic high molecular weight compound containing amino and/or imino groups and also active epoxy groups, so that it is able during the printing process to combine (cross-link) with the first basic compound and also with itself, thus forming filmlike products which securely bind the pigment to the textile material. The fact that this second basic high molecular weight compound containing reactive groups can undergo self cross-linking is an advantage, in that it allows excess of this compound to be used over that required to combine with the basic polyurea yet the excess will ultimately become a film-like product and not be left in the printed material to lower the fastness of the colouring to washing.

The special reactive basic high molecular weight compounds preferred are those which can be formed by reacting epihalohydrines or dihalohydrines with di- or poly-amines of the type of tetramethylene diamine, hexamethylene diamine, dipropylene triamine, $\gamma : \gamma^1$-diaminopropyl methylamine, and di-ethylene triamine by the reaction described in B.P. 774,101. The preparation of a satisfactory printing paste based on the above principles is as follows. A latex is first prepared so as to contain 40% of a copolymer resulting from the emulsion copolymerisation of 50 parts of styrene, 48 parts of acrylic acid butyl ester, and 2 parts of acrylic acid. The following are then mixed together

205 parts of the above latex.
195 parts of a 10% aqueous solution of the acetate of a basic polyurea produced from 0·05 mole of diethylene triamine, 0·95 mole of $\gamma : \gamma'$-diaminopropylmethylamine, and 1·01 mole of hexane diisocyanate.
30 parts of a 30% aqueous solution of the hydrochloride of a basic epoxy compound produced from 0·28 mole of dipropylene triamine and 1·00 mole of epichlorohydrin.
15 parts of 50% acetic acid and when after stirring, a homogeneous mixture is obtained there are added—
200 parts of a 20% red pigment paste.
50 parts of urea.
10 parts of iso-octyl alcohol.
60 parts of a 7% methyl cellulose thickening.
235 parts of water thus to make a total of 1,000 parts of printing paste.

It is equally satisfactory to use in the above printing paste $\gamma : \gamma^1$-diamino-propylmethylamine instead of dipropylene triamine. Such a pigment printing paste is applied say to cotton fabric in the usual manner by roller or screen printing equipment, and the fabric is then dried at 80°C. and in some instances further heated at 110 to 130°C. The resulting printed cotton or rayon staple fabric has excellent fastness to washing in a boiling soda liquor and possesses the desirable property of being fast to wet rubbing.

Another Pigment Printing Process

Pigment binders consisting of copolymers containing preferably 60 to 90% of styrene and the remainder of butadiene have been found very satisfactory since the printed fabric is left with a soft handle while the colouring is of very good fastness to rubbing. The use of such a binder still leaves something to be desired, however, as regards fastness to wet rubbing in the case of apron, garment, and table cloth materials which have to withstand prolonged vigorous mechanical washing at 60 to 80°C. It is thus useful to know (B.P. 784,880) that considerably improved fastness properties may be obtained if an ammonium salt such as ammonium acetate, carbonate, nitrate, thiocyanate, phosphate, etc., is added to the printing paste. It is somewhat surprising that this addition should so much improve pigment fixation which is especially marked for printed rayon staple fabrics. An additional advantage is that the colour brilliance is also notably enhanced. In a typical printing procedure of this kind a printing paste composed of the following is employed

2·5 parts of a fatty polyglycol ether (e.g., lauryl polyglycol ether).
82·5 parts of white spirit.
15 parts of water, all of these being emulsified before adding to 58 parts of the resulting emulsion.
10 parts of a red pigment.
30 parts of a 50% aqueous dispersion of a copolymer of 60 parts of styrene and 40 parts of butadiene, and
2 parts of a 50% aqueous solution of ammonium thiocyanate.

After printing with such a paste, rayon staple fabric should be dried for 3 mins. at 140°C. and then washed to free it from loose colour. Equally good results are obtained by using an equal amount of ammonium acetate or nitrate instead of ammonium thiocyanate.

Dyeing Hydrophobic Fibres

Some interesting observations have been made by Schroeder and Boyd (J. Text. Research, 1957, **27,** 275) concerning the various factors which influence the absorption of dyes by such hydrophobic fibres as acetate, "Dacron" (a polyethylene terephthalate fibre comparable to "Terylene" used in the form of staple fibre)

"Orlon," etc., but particularly acetate and "Dacron" fibres. In discussing the influence of dye structure Schroeder and Boyd note that in the dyeing process (using disperse dyes) the dye in solution is attracted to the surface of each fibre and then passes into the interior by a process of solution whose rate and extent is governed by the ratio of the solubilities of the dye in the fibre substance and in the surrounding aqueous dye liquor and also by the nature of the dye itself.

It is not of primary importance what is the nature of the chromophore in the dye but of much more importance is the molecular weight of the dye and the hydrophobicity of the dye molecule as a whole. In general, a high dyeing rate is assisted by the dye having a low molecular weight. It is generally recognised that the disperse dye should be free from ionic groups such as the sulphonic acid group but experience has shown that ionic groups can be tolerated if the mass of the dye molecule is appropriately increased to counteract the hydrophile nature of this ionic group and so keep the whole dye molecule sufficiently hydrophobic. This latter point can be illustrated by reference to the disperse dye 1 : 4-diamino-anthraquinone-2-sulphonic acid and its power to dye acetate fibres. This dye has no affinity or dyeing power for acetate fibres because of the presence of the powerful ionic sulphonic acid group but by loading the 4-amino group with hydrophobic groups (phenyl and para-butyl-phenyl) as shown in the formulae (Fig. 1) a sufficient hydrophobic balance is given to the dye molecule so that it acquires a progressively more useful dyeing affinity.

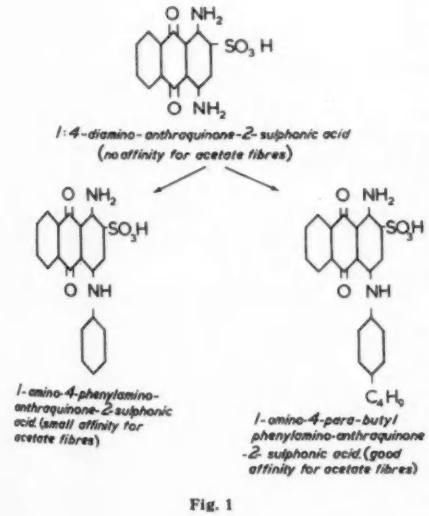

1:4-diamino-anthraquinone-2-sulphonic acid
(no affinity for acetate fibres)
1-amino-4-phenylamino-anthraquinone-2-sulphonic acid (small affinity for acetate fibres)
1-amino-4-para-butyl phenylamino-anthraquinone-2-sulphonic acid (good affinity for acetate fibres)

Fig. 1

The degree to which the above 1 : 4-diamino-anthraquinone-2-sulphonic acid dye requires loading with hydrophobic groups to make it a useful dye for acetate fibres is less than for "Dacron" (the 1-amino-4-para-butyl-phenyl amino-anthraquinone-2-sulphonic acid dyes acetate fibres but is not sufficiently hydrophobic to dye "Dacron") illustrates a further point that as the hydrophobicity of the fibre is greater so must the hydrophobic character of the dye be suitably increased. But this effect of hydrophobicity can be upset by subtle factors of fibre structure as may be shown by reference to the dyeing behaviour of 2-nitro-3-sulphonamide-diphenylamine and its derivatives towards acetate and the more hydrophobic "Dacron" fibres. Fig. 2 shows the formulae for this dye and two derivatives—in one of these the sulphonamido group is substituted by a hydrophilic hydroxyethyl group and in the other by a hydrophic phenyl group.

Somewhat unexpected is the fact that the phenyl group substituted in the sulphonamido group (dye C) in place of the hydrophile hydroxyethyl group (dye B) reduces the affinity of the dye for acetate fibres instead of increasing it as might be expected. On the other hand, the increased affinity of the dye C for "Dacron" fibres follows expectations.

In the case of dyes which readily dye "Dacron" it will often be found that the dye whose molecule is linear and long as shown in Fig. 3 will dye much more rapidly than any other which is square-shaped as shown in Fig. 4. Many examples could also be given of the effect of dye molecule size on the dyeing rate. In general, smaller the dye molecule and more rapidly will the dye be absorbed. All such facts as these indicate the difficulties connected with research having as their aim the discovery of dyes for hydrophobic fibres; so many factors must be taken into consideration in respect of the nature not only of the fibre but also of the dye. The degree of crystallinity of the fibre plays an important part not only in dye absorption, but also in determining the washing fastness of the dyed material. By contrast, fastness to gas fumes is largely dependent on the chemical nature of the dye, although to some extent the rate at which gas fumes can diffuse through the fibre has a considerable influence.

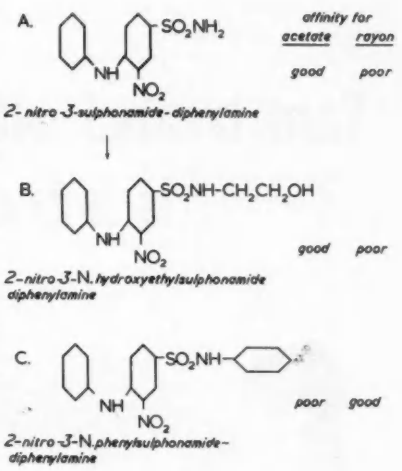
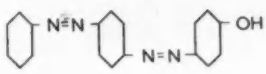


Fig. 2

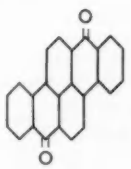
New Pre-metallised dyes for Wool and Polyamide Fibres

Earlier types of pre-metallised dyes in which the combined metal was usually chromium—but could also be copper—normally contained in their molecules, sulphonic acid groups for the purpose of giving the dyes a useful degree of solubility in water. Arising from the presence of these acid groups were certain disadvantages



(above) Fig. 3

(right) Fig. 4



one of which was the necessity to have present in the dyebath a rather high concentration of acid to aid dye exhaustion from the bath and dye fixation within the wool fibres. Under certain circumstances this high acidity could lead to impoverishment of the wool being dyed and to the production of skittery dyeings. Recent research in this field has been directed towards the discovery of wool dyes free from sulphonic acid groups (often also the somewhat weaker carboxylic acid groups) and this has been so successful that various dye makers are now marketing a new type of pre-metallised dye which can be applied under substantially neutral conditions and which furthermore has proved to have a very useful affinity for polyamide fibres as well as wool. The

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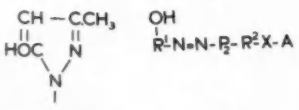
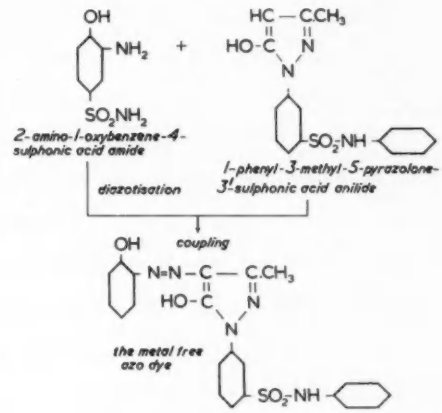
shades obtainable have also the advantage of being bright and fast to most adverse influences. A feature of these new dyes is that their water-solubility is derived from the presence in their molecules of sulphonamide, SO_2NH_2, or methyl sulphone, SO_2CH_3, or chloromethyl sulphone, SO_2CH_2Cl groups. But another important feature of the dyes is that they contain only about one half of the amount of complex-bound metal as do the former type of pre-metallised dyes, that is they contain one atom of chromium or cobalt or other metal bound to two molecules of the dye. In the past two or three years the range of these dyes have been steadily extended mainly by Ciba and Geigy firms. B.P. 784,138 gives interesting details how some new dyes of this type can be produced. Their water-solubility depends on the presence in their molecules of the sulphonamide group, SO_2NH_2. The new dyes described in B.P. 784,138 are made by treating one or two mono-azo dyes which are free from sulphonic acid and carboxylic acid groups and which conform to the general formula given in Fig. 5, with an agent capable of yielding chromium or cobalt (e.g., cobalt sulphate or acetate or sodium chromo-salicylate) under conditions (weakly acid or alkaline) such that one atom of the metal is complex-bound per molecule of the resulting monoazo dye. In the above formula, R^1 represents a benzene residue bound to the azo linkage in ortho-position to the hydroxyl group and containing a SO_2NH_2 group, while P_Z represents a 5-pyrazolone residue which is bound to the azo linkage in the 4-position, and R^2 represents a benzene residue and X represents an oxygen atom or a group of atoms which can act similarly in linking A to R^2 which is also a benzene residue. The essential feature of these dyes is that they all contain a 5-pyrazolone residue of the type indicated by the formula shown in Fig. 6.

Many pyrazolones suitable for the manufacture of these new dyes are already available and among these may be found 1-phenyl-3-methyl-5-pyrazolone - 3^1 - sulphonic acid - N - methylanilide which can be used in the following manner to produce a pre-metallised dye suitable for dyeing wool from a weakly alkaline, neutral, or acetic acid bath in fast orange shades or (from an acetic acid dyebath) nylon in similar fast shades. Firstly, 18·8 parts of 2-amino-1-oxybenzene-4-sulphonic acid amide are in hydrochloric acid solution diazotised at 0 to 5°C. and the resulting suspension of the diazotised compound is neutralised with sodium carbonate and at 10 to 12°C. is then poured into a solution of 33 parts of 1-phenyl-3-methyl-5-pyrazolone-3^1-sulphonic acid anilide also containing $4\frac{1}{2}$ parts of caustic soda. After the coupling to form the azo dye is complete this insoluble dye is filtered off and then boiled in an alkaline liquor containing 120 parts of sodium chromo-salicylate for three hours to effect the formation of a chromium complex of the dye; alternatively the metal-free dye may be similarly boiled with a solution of cobalt sulphate to secure a cobalt complex of the dye. Both of these metal-containing dyes are useful for dyeing wool and nylon as mentioned above. Formation of the above dye takes the course shown in Fig. 7. Under the conditions of treating the



(left) Fig. 6

(above) Fig. 5



(right) Fig. 7

metal free dye with the chromium or cobalt salt about one atom of the metal becomes bound in a complex manner (i.e., so as to lose its usual reactivity) within two molecules of the dye.

Dyeing and Printing Acetate and Polyester Fibres

It is well known that water-soluble acid wool dyes are not suitable for application to hydrophobic fibres such as acetate, "Dacron," and "Terylene" fibres. In general, the dyeing must be carried out using disperse dyes almost insoluble in water and which contain no sulphonic acid groups. An ingenious method recently devised (B.P. 784,668) makes it possible to use effectively those water-soluble dyes of the anthraquinone series which contain a sulphonic acid group in the 2-position and which are normally unsatisfactory. It consists of effecting the dyeing or printing in the presence of a reducing agent which, during dyeing, splits off the sulphonic acid group to leave a residual dye having satisfactory affinity for the hydrophobic fibres. Making use of this expedient it is now possible to employ for dyeing acetate (both secondary and tri-acetate) and "Terylene" fibre materials with such water-soluble dyes as:—1 : 4-diamino-anthraquinone -2-sulphonic acid, 1-amino-4-hydroxy-anthraquinone-2-sulphonic acid, 1 - hydroxy - 4 - phenylamino - anthraquinone - 2 - sulphonic acid, 1 - hydroxy - 4 - (4^1 - methoxy) - phenylamino - anthraquinone - 2 - sulphonic acid, and many others.

The expedient indicated above thus consists of changing the water-soluble dye during dyeing to its insoluble form by eliminating its sulphonic acid water-solubilising group at a suitably slow rate that no precipitation of the newly formed water-insoluble dye takes place before this latter can be absorbed into the material being dyed. As might be expected it is sometimes desirable to assist dye absorption by having present in the dyebath a suitable proportion of a fibre swelling agent and/or a dye carrier. When dyeing polyester fibre materials such fibre swelling agents as trichlorobenzene, benzoic acid, and 2- or 4-hydroxy-1 : 1^1-diphenyl may be used advantageously and dyeing temperatures above 100°C. may prove beneficial if "closed" dyeing apparatus is available (125°C. is a satisfactory dyeing temperature under such conditions). The following are examples of the manner in which "Terylene" and acetate fibre materials may be dyed.

(1) 100 parts of "Terylene" material are introduced into a dyebath at 60°C. which contains 3,000 parts of water, 4 parts of sodium 3-carbethoxy-4-(2^1-cyano)-

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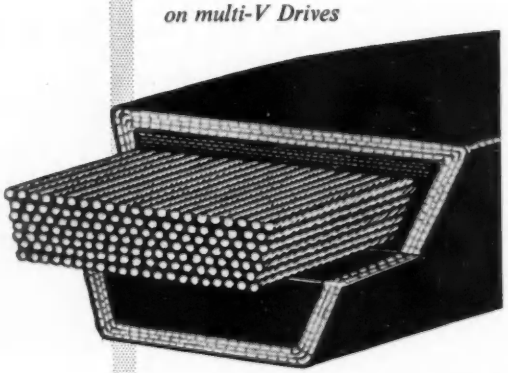

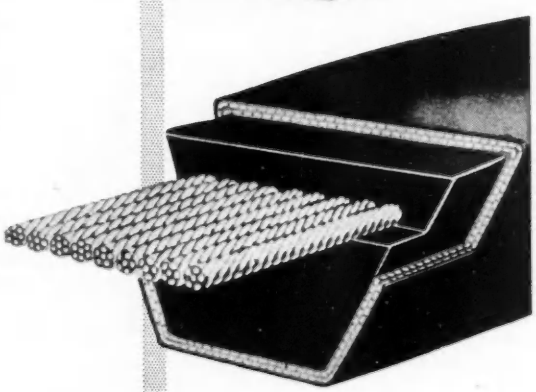

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propylamino-1: 9-anthrapyridine-2-sulphonate (the acid dye), 1·5 parts of zinc formaldehyde sulphoxylate, and 1·5 parts of 2-hydroxy-1:1¹-diphenyl (the fibre swelling agent), and the temperature is then raised to the boil within 20 mins. On continuing the dyeing for 60 mins. the "Terylene" fibres acquire a level yellow shade of good fastness to light and washing.

(2) **100 parts of acetate rayon fabric are entered into a similar dyebath as that mentioned above but containing 4-parts of ammonium 1-hydroxy-4-(4¹-methoxy)-phenylamino-anthraquinone-2-sulphonate and 1·5 parts of zinc formaldehyde sulphoxylate and the temperature is then raised to 80°C. within 20 mins. Continuing the dyeing at this temperature for 60 mins. the acetate fabric becomes dyed to a level pure violet shade of excellent fastness to light and washing.**

In the above examples of dyeing, zinc formaldehyde sulphoxylate is the reducing agent which removes the sulphonic acid group from the acid dye but it is possible to use alternative reducing agents such as sodium formaldehyde bi-sulphite, a reducing sugar such as glucose, or a metal salt having reducing properties such as stannous chloride, or even zinc dust.

As an example of the manner in which this special method may be used for printing "Terylene" fabric the following may be quoted. The printing paste is prepared with

20 parts of potassium 3-carbethoxy-4-(2¹-cyano) propylaminol: 9-anthrapyridine-2-sulphonate.
100 parts of thiodiglycol.
450 parts of 33% crystal gum thickening.
20 parts of sodium formaldehyde sulphoxylate.
20 parts of potassium carbonate.
390 parts of water.

The printed fabric is dried at 50°C. and then steamed for 30 mins. under normal steam pressure (temperature 100 to 105°C.), and for a further 10 mins. at an excess steam pressure of 0·8 atmospheres (temperature 120°C.). The fabric is then rinsed, soaped at 50°C., again rinsed and dried, and a fast coloured yellow printed pattern is thus produced. Orange and bluish red prints may be similarly obtained by using sodium 3 - carbethoxy - 4 - anisidino - 1 : 9 - anthrapyridine - 2 - sulphonate and sodium 1 - amino - 4 - iso - pentyl - sulphonylamino - anthraquinone - 2 - sulphonate respectively.

It has been mentioned that the process is also suitable for dyeing and printing cellulose triacetate fibre goods. A blue print can be obtained using a printing paste consisting of

20 parts of sodium 1-amino-4-(4¹-methoxy)-phenylamino-anthraquinone-2-sulphonate.
80 parts of thidiglycol.
20 parts of Tetracarnit (the fibre swelling agent).
360 parts of water.
450 parts of a 33% crystal gum thickening.
50 parts of potassium carbonate.
20 parts of sodium hyposulphite.

The printed fabric is dried, steamed for 30 mins. at 100 to 103°C. and then for 15 mins. at 110 to 112°C. (with excess steam pressure).

Level-Dyeing Process for Acrylic-Cellulose Mixture Goods

Acrylic fibres such as "Orlon," dynel, etc., have little if any affinity for direct cotton dyes, acid wool dyes, and most of the water-soluble acetate dyes so that if fabrics consisting of both an acrylic and a cellulose derivative fibre are dyed in the one bath containing such dyes, the acrylic fibre is left undyed or only slightly stained while the cellulose acetate fibre acquires a deep shade. Further, it is not satisfactory to apply the direct cotton and the acid wool dyes to the mixture material having present cuprous ions to assist the acrylic fibre to dye. But according to B.P. 784,191 if the cellulose fibre is pre-treated with one or other of certain colourless organic nitrogenous compounds having a substantive affinity for it, then the application of either of the above three classes of dye by the cuprous-ion dyeing technique will become satisfactory and yield equal depths of shade on the two different types of fibre present. Alternatively the special organic nitrogenous compound may be added to the dyebath thus avoiding troublesome pre-treatment of the cellulose acetate fibre.

Among the many organic nitrogenous compounds which have been found useful are saturated heterocyclic compounds having three to seven members in the ring including a single nitrogen atom, cyclo-aliphatic amines, amides obtained by condensation of aliphatic monocarboxylic acids (the chain of which contains at least twelve carbon atoms) with a polymethylene diamine, and the formaldehyde-bisulphite complexes of these various compounds. Thus bis-4 : 4¹-(cyanoethyl-amino)-dicyclohexylmethane, cyanoethyl - spiro - cyclohexyl - ethyleneimine, and piperidine can be used. All of these substances are readily absorbed by cellulose acetate fibres when they are applied from an aqueous solution or dispersion at 50 to 100°C.

For producing a level royal blue shade on a fabric made with "Orlon" and cellulose acetate yarns the following method is recommended. The fabric is first treated in a liquor (ratio of fabric to liquor is 1/50) containing 10% of the formaldehyde-bisulphite complex of bis-4 : 4¹-(cyanoethylamino)-dicyclohexylmethane and 0·2 g. per litre of a wetting agent, and is then rinsed and introduced into a dyebath containing

5% of Anthraquinone Blue SWF 150% conc.
0·6% of Rocelline S.
3 c.c. per litre of acetic acid.

After treatment in this dye liquor at the boil for 60 mins. there is added

10% of copper sulphate crystals.
4% of sodium formaldehyde sulphoxylate (this reduces the copper sulphate to form cuprous ions in the dyebath) and the dyeing is continued for one-half hour at the boil when the dyeing is complete.

This special method of dyeing is applicable to textile materials containing mixtures of such fibres as those made from vinyl chloride, vinylidine cyanide, methacrylonitrile, vinyl acetate, secondary cellulose acetate and cellulose triacetate.

U.K. Wool Imports

Imports of wool into the U.K. in the first two months of this year totalled 110·9 million lbs. (actual), compared with 138·5 million lbs. in two months of 1957 and 150·8 million lbs. in the similar period of 1956, according to B.o.T. Trade and Navigation Accounts. Compared with a year ago, however, imports from Australia were slightly higher, having increased from 51·3 to 52·3 million lbs. but those from N. Zealand fell from 40·3 to 34·7 million lbs., and South African shipments from 8·9 to 8·4 million lbs. The main decreases were in imports from Uruguay, from 9·5 to 1·2 million lbs.; from the Argentine, 7·9 to 1·2 million lbs.; and from India, 3·8 to 2·1 million lbs. Total imports of greasy merino wool were down from 59·6 million lbs. in the first two months of 1957 to 53·9 million lbs. in the corresponding period of this year. Imports of greasy crossbred wool were down over the same period from 52·4 to 37·9 million lbs.

Terms and Definitions

Several hundred more textile terms and definitions will shortly be published by the Textile Institute. They cover virtually all sections of the industry and are calculated to assist the textile technologist to keep his nomenclature up to date.

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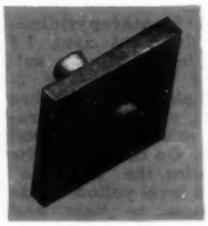

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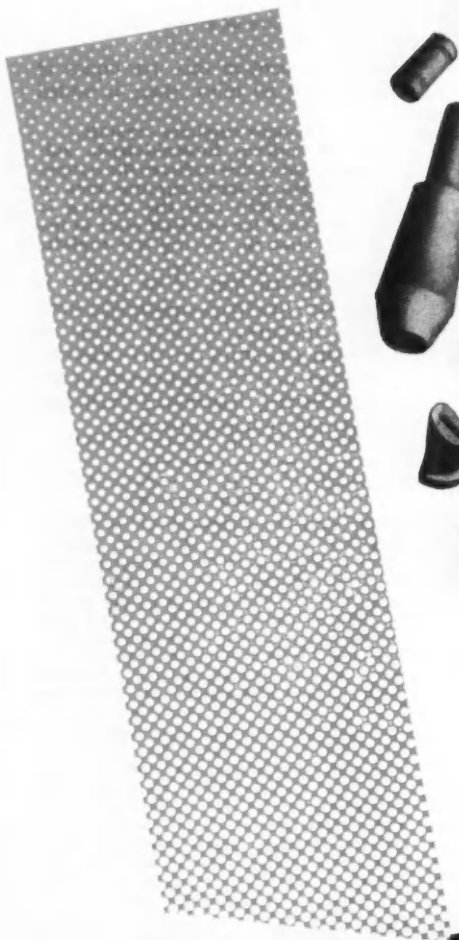

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Continuous Bleaching of Cotton Fabrics

A new process is said to simplify the conditions and equipment required

A NEW bleaching process for cotton fabric[1] recently reported from America appears to go a long way towards simplifying the conditions and equipment required so that this necessary stage in the preparation of cotton piece goods for dyeing and finishing might be made less arduous and cheaper. It is based on the idea of combining an alkali-boil with a hydrogen peroxide bleach into one treatment which can be carried out while the fabric runs continuously through apparatus especially designed for this purpose.

How to alkali-scour and hydrogen peroxide bleach cotton fabric which is continuously moving is already well known but such a process involves a kind of duplicate plant, i.e., the fabric is required to be padded with a caustic soda scouring liquor and then be held at about 212°F. while passing through a J-box so that it can then be washed-off and further led through a padding mangle containing the hydrogen peroxide liquor to be similarly held at an appropriate temperature in a second J-box before final washing. The use of two padding mangles, two J-boxes with the necessary steaming devices, and two washing machines make the whole plant both expensive and complicated. The new process approximately halves such plant in so far as the fabric is padded initially with both caustic soda and hydrogen peroxide so as to require treatment in only one J-box before being washed off and left a good white.

In order that the new process may become possible it has been necessary to solve a few problems which hitherto appeared insoluble. For example, it has been necessary to devise a stable bleach liquor since it is well known that the presence of caustic soda in a hydrogen peroxide solution can lead to rapid decomposition of the latter with liberation of gaseous oxygen which thus escapes its proper use in bleaching the cotton. It has been experienced even when such stable conditions have been devised that there is risk holes might be produced in the cotton fabric as the result of excessive bleaching action set up locally where catalytic impurities might be present. Experience has also shown that in bleaching cotton with a liquor containing both caustic soda and hydrogen peroxide the first formed white is liable to deteriorate and darken if all the hydrogen peroxide is exhausted from the bleach liquor before the final washing stage. Another requirement of the new process is that it shall effectively destroy motes and other similar impurities in the cotton and which it has hitherto been generally agreed require a prolonged caustic soda boil for their removal. All these difficulties, however, appear to have been solved successfully since it is claimed that over 1,000,000 yds. of cotton fabric have been satisfactorily bleached by the new process.[1]

With this new process the cotton fabric must first be de-sized so that it is freed from all impurities introduced during sizing or other previous treatment. This can well be carried out by padding the fabric in open width with an aqueous liquor at 140 to 160°F. containing (by weight) the following ingredients:—

- 3% of Neozyme L (a proprietary mixture of amylolytic and proteolytic enzymes.
- 2% of Triton 770 (an alkylaryl polyether sulphide).
- 0·1% of cetyl betaine

and then piling it to lie for several hours to allow the enzymes to liquify starch and protain impurities so that these may be completely removed in the hot washing which follows.

The de-sized fabric is then saturated at 70 to 80°F. with the following combined scouring and bleaching liquor containing (by weight) the ingredients set out below:—

- 1·5% of hydrogen peroxide.
- 2·5% of sodium silicate solution of 42 Bé.
- 0·6% of caustic soda.
- 0·5% of borax.
- 0·1% of Triton X.100 (an alkoxylated aryl polyether alcohol).

Thereafter the fabric is mangled so as to retain 90 to 110% of the liquor, run through a steaming device to raise its temperature to 210 to 212°F., and then pass through the usual form of heat-insulated J-box at such a rate that it occupies 1½ hours to pass through while being held at a temperature not below 205°F. The fabric is then washed twice with hot water and dried on a clip stenter.

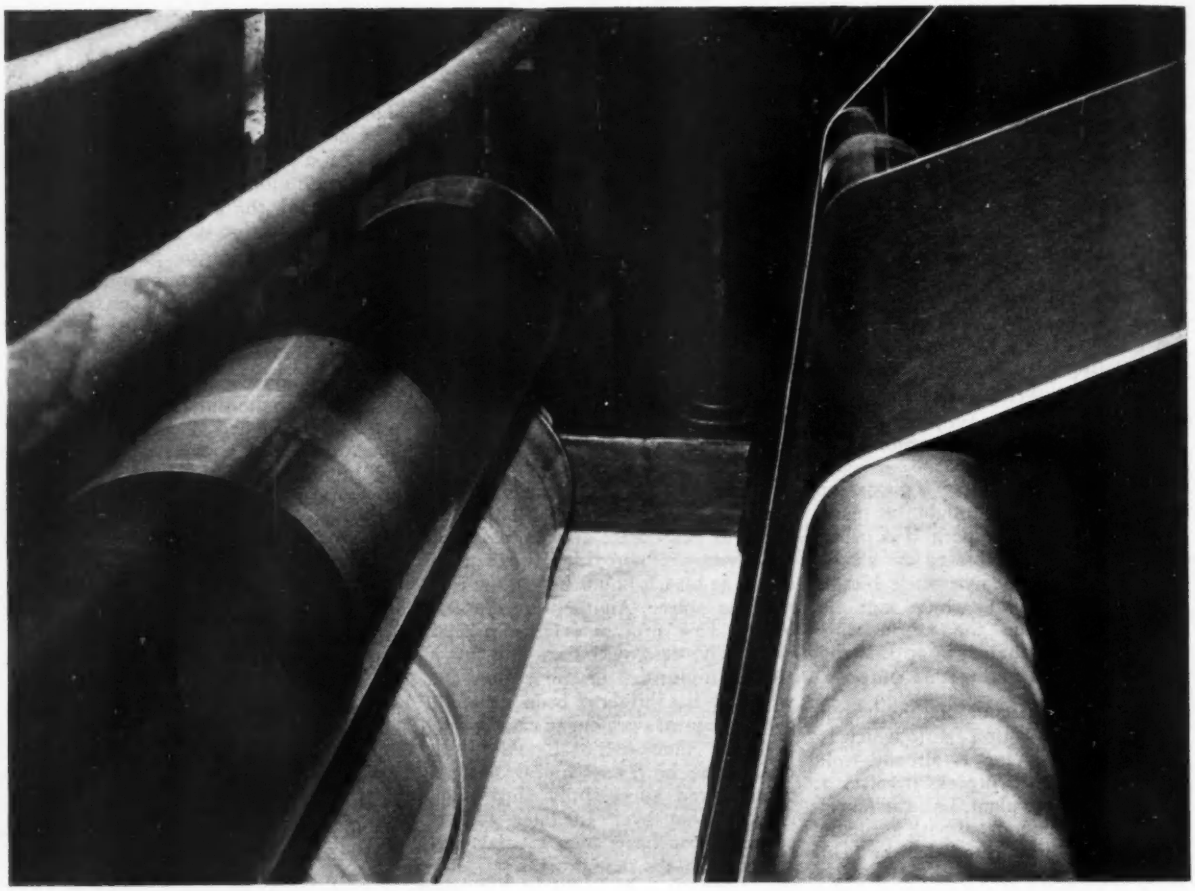
The following observations will indicate how the difficulties of such a process mentioned above have been overcome. Firstly, the proportions of the ingredients of the padding liquor are carefully chosen to give it the necessary stability. The presence of the borax prevents the formation of pin-holes in the fabric during its treatment in the J-box by making passive any impurities in the fabric which could accelerate the bleaching action sufficiently to cause such holes. Finally, the conditions of bleaching are chosen so that there is left in the fabric as it leaves the J-box at least 15% and preferably at least 20% of the original amount of hydrogen peroxide applied to it.

One other precaution to be taken is that the fabric leaving the J-box should be washed at once since if left lying about the residual alkali content and the lowering of the hydrogen peroxide content which would ensue has a darkening effect on the colour of the fabric. It is necessary for the bleaching liquor to contain the relatively high content (1·25 to 2·0%) of hydrogen peroxide since a small proportion will fail to give a satisfactory white and will certainly fail to destroy any motes and shives present in the fabric while a larger proportion than 2% will cause excessive degradation of the cotton fabric as may be indicated by too high a cuprammonium fluidity.

If in the bleach liquor described above say 1·94% of caustic soda is present instead of the 0·6% specified then the fabric bleached has an undesirable brittleness while if the borax is omitted then pin holes will be found in the bleached fabric. However, it is permissible to employ sodium perborate instead of hydrogen peroxide itself and in this case adjustment of the amount of borax added must be made to bring the total borax present within the limits of 0·25% and 2·0%.

Reference

(1) B.P. 789,585.



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Dyeing Wool/Synthetic Fibre Mixtures

A review of the current methods of dyeing wool/polyamide, wool/polyacrylonitrile and wool/polyester blends, also the fastness requirements of the end product

By E. BELLHOUSE †

WOOL/polyamide mixtures have been in use for a considerable time and many of the early dyeing problems overcome. These mixtures can be dyed by methods similar to those used for wool alone provided due attention is paid to the possible "blocking off" effects and proper use made of restraining agents for the nylon. The bulk of wool/nylon has been confined so far to the hosiery trade where dyeings of good wet fastness are normally required. I think the demand for good wet fastness has contributed towards solving the dyeing problems for various reasons. First, the fundamental procedure for matching shades to give good wet fastness is where possible to base the dyeing on the nearest homogeneous colour and employ suitable shading colours. This reduces the problem of off-tone unions often encounted when using red- yellow-blue combinations of the level dyeing acid colours. Secondly, the faster to washing colours of the weakly acid and Polar type generally speaking give good build-up on polyamide fibres, as do a considerable number of chrome dyes, so that "blocking" effects are not often serious.

Finally, we come to a class of dyes which merit special mention. The neutral dyeing metal complex dyes of the Irgalan type give excellent results on wool/polyamide mixtures and one might say they were built for the job; their properties make them ideal for this application. The build-up on polyamide fibres is excellent, saturation values being well above the level at which actual dyestuff cost becomes prohibitive, and there is no possibility of "blocking off." The individual dyes give good solidity on the two fibres and generally behave well in combination although it is worthwhile experimenting to select the most suitable combination for a given shade.

The main difficulty with these colours is retarding the nylon dyeing sufficiently to get a solid union in pale to medium shades, particularly with the readily dyeable nylon 6 or perlon types. Much can be done, however, with restraining agents such as Erional NW, and the maximum effect is usually obtained by pre-treating with this in the blank neutral dyebath. Under these conditions the Erional NW is taken up almost exclusively by the polyamide fibres and not by the wool.

The Irgalans cover a very wide range and can be supplemented for the fuller shades by chrome colours but these cannot be used indiscriminately. It is necessary to select carefully to avoid those which do not develop well on polyamide fibres and also to avoid "blocking off." However, a good selection of suitable colours is available and there are many commercial mixtures, balanced to give good unions on a variety of blends.

Nylon is used to some extent in the woollen trade often in proportions of 5–10% in various blends, also in the form of blazer cloth warps. In both cases it is often found that no great variation of dyeing method is necessary from that of a similar dyeing of 100% wool and the nylon will be covered adequately when present in small proportions with the wool and intimately mixed or when present as a warp and covered by the woollen weft.

Wool/Polyacrylonitrile

There are two types of acrylic fibre to be considered, first those containing acidic groupings, and dyeable therefore with basic dyes, the principal examples being "Orlon," "Dralon" and "Courtelle." Secondly, the acrylics having some basic characteristics and dyeable with acid colours, "Acrilan" being the main example. There are in addition, several other acrylics such as "Dynel" and "Darlan" but for the most part these are available in relatively small quantities and appear to find speciality uses such as the manufacture of fur fabrics, rather than being blended with wool.

Several methods are available for dyeing "Orlon" fibre alone (*a*) with disperse dyes (*b*) with basics or (*c*) by the cuprous ion technique. When considering mixtures with wool, this last method may be rejected on practical grounds because of interference from the wool, quite apart from the inherent unlevel dyeing characteristics of the method itself. It is, however, possible to dye these mixtures using disperse dyes for the acrylic fibre, clearing the cross staining from the wool where necessary using hydrosulphite and then cross dyeing the wool. This method, however, is tedious, shade matching is difficult and reproducibility is poor. The most attractive method of dyeing these mixtures is by use of the modified basic colours and in this connection the introduction of our new range, the Maxilon colours represents a considerable step forward. They dye the acrylic fibre very well and give almost negligible staining of the wool.

The essential features of the practical application of Maxilons are careful control of pH conditions together with the use of appropriate retarding agents. Above pH 6 the two Maxilon Blues are destroyed in solution at the boil. If the pH drops much below 4 then exhaustion, particularly of the Red BL is seriously affected. These limits define the practical region for application. A pH of 4·0 to 4·5 is desirable and acetic acid together with sodium acetate where necessary is normally employed.

The "I.T." Method

As with all basic colours of this type, there are considerable differences in rate of exhaustion of the individual colours and in sensitivity to pH. Little or no uptake of dye occurs below about 90–95°C. but the colour goes on quickly at the boil and some form of retarding agent is desirable. Various products have been suggested—mostly the cationic type—which compete with the dyestuff for the dyeing sites but these have the disadvantage of increasing differences in rate of strike, so that control of a combination shade is made more difficult.

By using a strongly anionic agent, Irgasol DA, a marked retarding effect is produced and moreover, differences in dyeing characteristics are considerably diminished to give much more uniform dyeing in combination shades. Use of an anionic product with cationic dyes obviously carries the attendant possibility of co-precipitation. Irgasol DA is, in fact, remarkably free from this trouble but even so the addition of a non-ionic agent, Irgasol PMC, is recommended as a safeguard.

For the acrylic fibre the procedure is to dye with 0·5 to 0·2 gram/litre Irgasol DA, using the larger amount for paler shades, 1 gram/litre Irgasol PMC and acetic acid/sodium acetate to bring the pH to about 4·5. Dyeing takes place at the boil in 1½–2 hours. Under these conditions the wool is left virtually white. Dyeing of the wool can in many cases take place in the same bath simultaneously using selected Polar and fast acid dyes, which will dye satisfactorily under the above conditions. The Irgalans can also be employed for this single bath method within certain limits, namely, that the total amount of Irgalan

* *From a paper given recently to the Guild of Technical Dyers in Leicester.*

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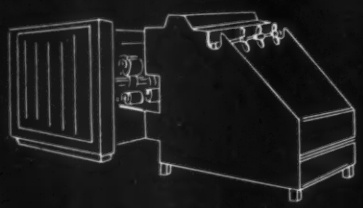

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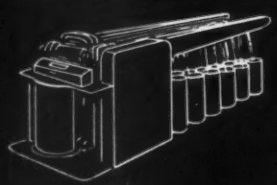

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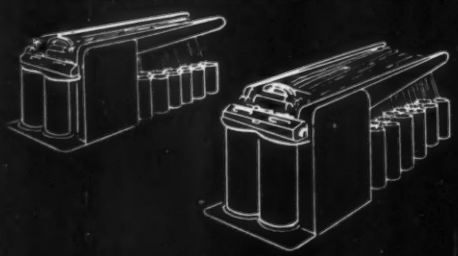

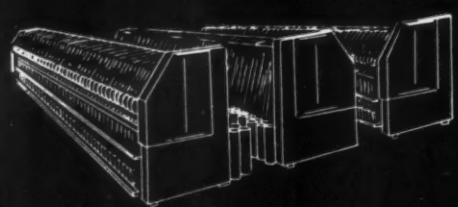

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colour should be restricted to 1% and certain brands should be avoided.

A very wide range of colours can be obtained. It is quite possible to get sufficiently near to black on the acrylic with Maxilons to give a good result in a union but the cost in many cases would be prohibitive. Fortunately the cheaper conventional type of basic dyes may be used in conjunction with the Maxilons for these very full shades to reduce cost whilst maintaining reasonable fastness.

The standard of fastness of the Maxilons is very high. They are uniformly resistant to wet processing and are unaffected by severe washing. The blues and red are very fast to light; the yellow is slightly less fast but gives dyeings of light fastness of about 5 or more even in pale combination shades. There is of course a wide range of fast to light and washing wool dyes to cater for the other half of the union.

"Courtelle"

What applies to "Orlon" also applies to "Courtelle" but an additional factor has to be considered i.e., development of alkalinity during dyeing. We do not know the nature of this alkali and this is not important. The remedy is to give a short pretreatment at the boil with acetic or formic acid, and this can usefully be combined with a scouring process to remove any anti-static on the fibre. The procedure is to boil for 20–30 mins. in a bath set with 1 gram/litre glacial acetic acid and 1 gram/litre Irgasol PMC or Tinegal VR, followed by thorough rinsing. Dyeing is then carried out as for wool/"Orlon" unions.

Shading for matching purposes is a relatively simple procedure for the acrylic fibres because of the temperature range properties of the Maxilons. There is virtually no take up of colour below 90°C. and in many cases the dyebath temperature will fall below this if the steam is turned off whilst a sample is dried and examined. The required addition is made, the bath brought back to the boil in 20 mins. and boiled for 20–30 mins. For the wool portion, the same procedure is adopted as for normal wool dyeing with the fast to washing colours and a good selection of Polar, Irgalan and fast acid colours suitable for shading purposes is available.

Stripping and Levelling

With acrylic fibre unlevelness should not normally be encountered; if the correct dyeing procedure is followed, the uptake of colour is slow and even. However, slight unevenness may be corrected by boiling in a bath set with 0·5–1 gram/litre Irgasol DA and a small amount of acetic acid. A more extensive strip is given by boiling with Irgasol DA and urea under neutral or slightly alkaline conditions.

Wool/"Acrilan" Unions

"Acrilan" is dyeable with most of the wool dyestuffs but careful selection is necessary to obtain good fastness to light and washing. The fastness of dyestuffs on wool cannot be taken as any indication of fastness on "Acrilan" and in many cases the difference is remarkable. On 100% "Acrilan" usual practice is to select particular members of various ranges depending on the shade required. The Irgalan colours are excellent for pale to medium shades and selected acid dyes and chrome colours are suitable for medium to full range. The dispersed colours are also excellent for many requirements, especially in the medium shade range and have the advantage that dyeing is carried out neutral and maintains the "Acrilan" in the best possible condition.

In unions with wool, however, the disperse dyes introduce too many practical difficulties in wool staining and the use of wool dyestuffs is more straightforward. If a wool/"Acrilan" mixture is dyed with wool colours under the conditions used for wool alone, then usually, in a normal dyeing time the "Acrilan" is much lighter than the wool. If the colour has good migration, a gradual transfer from the wool to the "Acrilan" will occur on boiling. The degree of transfer is however not sufficient with many dyes to facilitate practical dyeing operations. It is found that the affinity of "Acrilan" is increased greatly when sulphuric acid is present, and use is made of this fact in dyeing wool/"Acrilan."

It is convenient to consider the Irgalan colours separately from the acid and chrome colours in this connection and, taking the latter first, the situation is as follows. A relatively simple but rather long method for applying acid or chrome colours is to pretreat the material in a bath containing 2 grams/litre sulphuric acid for about 20 mins. at or near the boil, to rinse near the boil and then dye in a separate bath set with 2% sulphuric acid and 2–3% Tinegal W. The process can be useful where heavy shades are required and where the "Acrilan" may therefore tend to be lighter. It has the advantage of using only a small amount of acid in the dyeing and reduces the possibility of acid damage. This pretreatment method was extensively used in the early development stages of dyeing these mixtures but an obvious need for a shorter method was found. Increasing the amount of sulphuric acid used in dyeing, and calculating the quantity on volume concentration of the dyebath enabled solid shades to be obtained. It is also necessary to use some form of retarding agent, particularly with the less strongly acid dyeing colours and the most effective are the slightly cationic type such as Tinegal W. The effect of this retarding agent is threefold.

(1) It reduces the overall speed of dyeing and thus assists general level dyeing.

(2) By retarding the uptake of colour by the wool in the early stages it allows the "Acrilan" to catch up whilst colour remains in the bath.

(3) Being slightly cationic and also being a stripping agent it promotes transfer of colour from the wool to the "Acrilan."

A side effect which must be considered with these products—either of the mildly or strongly cationic type, is that of the possibility of co-precipitation. This effect varies with the individual dyestuff and cationic agent, but it is advisable to guard against it by adding a dispersing agent of the non-ionic type, for example Irgasol PMC or Tinegal VR. The addition of this type of product also guards against precipitation of dyestuff due to the strongly acid dyeing conditions.

Irgalan Dyestuffs

The neutral dyeing metal complex colours fall into a different category. They are excellent as a group for dyeing wool/"Acrilan" unions in shades up to medium depth. Generally 2–3% should be regarded as the upper limit. Sulphuric acid is used, but a lower quantity is required than for the acid and chrome dyes. Dyeing is carried out with 4% sulphuric acid, 2% Tinegal W and 2–3% Irgasol PMC. Satisfactory unions are obtainable after 1½–2 hours boil.

For a wide range of mode shades, the combination of Irgalan Brown FL, Yellow 2RL and Grey BL gives good results. Irgalan Browns 2RL, 2GL and 3BL are not particularly useful as they give off-tone unions, whilst Irgalan Yellow GL and Irgalan Brilliant Green 3GL require a longer boil or more acid to give solid shades.

Physical Properties

An important point to be watched with "Acrilan" in particular and consequently with blends is its thermoplasticity. At temperatures above approximately 70–75°C. the fibre becomes increasingly plastic and any sudden cooling can easily produce permanently set creases or running marks together with a general hardening of the fabric. Creases so formed can be removed by re-heating to the boil, followed by slow cooling. It is extremely important to pay careful attention to cooling down on completion of a dyeing and the rate of cooling should not exceed 1·5°C. (3°F.) per min. until the temperature is below 70°C. Where strongly acid dyeing methods have been used, it is usually desirable to neutralise. This is done at about 70°C. with a short scour using 1 gram/litre non-ionic detergent and 1–2% ammonia.

Wool/Polyester

This also is a relatively new blend and, in my experience, it seems more usual at present to dye the wool and "Terylene" separately in slubbing or loose form. This applies particularly to the worsted trade, but a considerable amount of dyeing is in the made-up form. Only one dyeing method comes into consideration—the use of disperse dyes for the "Terylene," and various types of wool dyes for the wool. For paler shades, the "Terylene" can be satisfactorily dyed at the boil with selected disperse dyes and in many cases neutral dyeing wool dyes can be applied in the same bath. An enclosed machine is preferred and nearer one gets to 100°C. the better.

Considering the fuller shades, it appears preferable to dye in two stages, first the "Terylene," possible with a carrier such as o-phenyl-phenol and then the wool. If the wool is very heavily stained after the first stage, some form of clearing treatment is desirable, either a scour, or a "reduction clear." The method is fairly long, and shade matching is by no means straightforward but it is a practical possibility. The cross-dyeing of the wool can be done with almost any class of colour, but for fast to washing shades, the Irgalans and Polars, and possibly chrome colours, are of principal interest.

Textile Institute Diplomas

Fellowship of the Institute has been awarded to R. L. Elliott, B.Sc., Ph.D., F.R.I.C., F.S.D.C., head of department of chemistry and dyeing, Institute of Technology, Bradford; R. Hullah, F.R.I.C., A.T.I., technical chemist, Woolcombers Ltd., Bradford 9; S. R. Ramachandran, B.A., M.Sc., Ph.D., director, chemical processing of textiles, Office of Textile Commissioner, Bombay; R. J. Summers, M.Sc.Tech., Ph.D., A.M.C.T., A.T.I., head of man-made fibres dept., Textile Machinery Makers (Research) Ltd., Helmshore.

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Carpet Manufacture

An outline of some of the many factors involved in the production of traditional carpets and car carpeting

ADDRESSING Huddersfield Section of the Textile Institute recently on the subject of carpet manufacture, Mr. G. B. Angus (director, John Crossley and Sons Ltd.), said that the selection of dyestuffs to be used for producing their shades was a subject which received continual attention and they tested scores of dyestuffs every year with a view to improving the fastness of their products. For hank dyeing, obviously the main consideration must be the ability to produce level hanks, and in the hank dyehouse they used the fastest to light levelling dyestuffs available. In dark shades this type of dyestuff tended to have a low washing fastness and in recent years they had made strenuous efforts to improve the fastness to water of many of their dyeings, especially the dark reds which had been popular for some time. Careful control of dyeing conditions enabled them to dye acid milling colours on yarn, and all their dark shades were now dyed with neutral dyeing type colours giving a vastly increased standard of wet fastness over the old type dyeings which were based on Carmoisine and Red 6B.

For specific orders requiring extreme standards of fastness, Mr. Angus said they had experimented with the application of chrome colours and now regularly dyed several shades on yarn using after-chrome colours. This continuous step up in fastness was obviously a very desirable process and it seemed that before many years had elapsed, the use of ordinary fast to light acid colours on carpet yarns would have largely disappeared. It would indeed, be a happy day, he went on, when they would be in a position to say that their dyestuffs were so fast that there was little use examining any more colours in an attempt to improve their product, and it seems to him that this might very well happen in the course of the next 10 or 20 years.

Referring to loom construction, Mr. Angus said efforts had been made to combine the best qualities of the spool axminster and the gripper axminster whilst trying to avoid their weaknesses, and they had a range of gripper spool looms in which an attempt had been made to do just this. Broadly speaking the colour selection mechanism on these looms was that used in spool axminster, so that the advantage of unlimited colouring was obtained, while the weaving mechanism proper was that of the gripper loom, so that some of the yarn wastage was avoided. These gripper spool looms were 12/4 and 16/4 and the conveyor chain was arranged so that the two patterns could be carried in the chain at any one time, thus the loom could weave on spools, 1, 3, 5, 7 or on spools, 2, 4, 6, 8, so that a certain measure of flexibility for loom loading was provided. The amount of yarn required to fill the spools on one of these looms was staggering; 4,000 lbs. for a ground shade was quite common. These looms produced both carpet squares and Axminster broadloom and some of the floral broadlooms produced on these looms were extremely attractive.

Other looms used in the carpet industry mentioned by Mr. Angus included the chenille looms which used to be extremely popular, but which had now fallen into disfavour, and the face to face looms which wove two carpets at once, the carpet being cut up the middle as weaving proceeded.

Finishing Carpets

Following weaving, the carpet proceeded into finishing where it was brushed, mended, cropped and possibly backsized. Brushing was carried out to remove the loose fibre always present on a newly woven carpet. Mending consisted of replacing any tufts missed in weaving and cropping was employed to impart a smooth, level finish to the carpet.

High quality carpets were not normally back-sized, in that being firm in structure they lay flat on the floor without further processing. Axminsters were normally back-sized to give them a firm handle and to stop wrinkling-up when laid. Mr. Angus said their 3/4 Axminster sizing machine was somewhat unusual in that the drying of the size after application was carried out by means of radiant heating obtained by the use of gas heated panels. This machine was originally an experimental machine pressed into works production some seven or eight years ago, and had remained a production machine ever since. This was possibly one of the consequences of an experimental machine working successfully on its first trial. The company's broadloom sizing machine, a comparatively new unit, was possibly unique in the carpet field. The unit, 20 ft. wide, consisted of a complete sizing plant followed by a high temperature nozzle type drier which dried the carpet in an incredibly short passage. Since building this machine, rubberising equipment had been tacked on so that it was also used for applying a rubber backing to conventional types of carpets. Another interesting application for this machine was for the application of an anti-soil finish. The use of synthetic fibres in carpets had led to some complaints in as much as that carpets containing these fibres tended to soil more rapidly. Considerable work had been carried out on this particular soiling problem.

A carpet containing a 50/50 blend of wool and "Fibro" in the pile was marketed by the company, said Mr. Angus, which had been the subject of a good deal of investigation. Early samples showed a tendency to soiling and after a good deal of investigational work, it was conclusively proved that this was due to the spinning oil from the jute slowly "wicking-up" to the top of the tuft. This problem did not occur with woollen yarns. To overcome this, a complete spray unit was fitted on the back-sizing machine and all their blended carpets were now given an anti-soiling finish during back-sizing. This made an appreciable difference to the amount of soiling experienced during wear but, from the mode of action of the product used it was unfortunately, of no value for all woollen carpets.

In addition to the manufacture of traditional carpets, Crossley's also had a plant for manufacturing car carpeting which turned out as much cloth as the rest of the factory put together. This was a very interesting and complicated plant and one which certainly interested everyone who had had the opportunity to see it. In this process the pile fabric was not spun and the carpet was made from loose material as it left the conventional woollen cards. The base of the carpet was a coarsely woven hessian cloth coated with a reclaimed rubber dispersion, the rubber being dried at a comparatively low temperature so that curing did not take place; this operation was carried out away from the machine proper. The pile material for the carpet was dyed in the loose stock dyehouse and was blown into huge bins ready for transferring to the Duravel machine. The machine was equipped with two cards one immediately above the other so that whilst one card was being fettled the second card was running.

The machine itself consisted of a huge drum, about 10 ft. dia. and 8 ft. wide. Across the surface of the drum, thin strips of metal are placed (7 per ins.) to form a series of grooves. The carded fibre was fed over the top of the drum and by means of an intricate inserting device pushed into the grooves formed by the strips of metal. As the drum slowly revolved the inserted material was sprayed with the rubber dispersion and then rolled to push the dispersion into the fibre. The sprayed hessian, mounted on the rear of the drum, was led forward and the sprayed fibres fastened to it by the action of electrically heated presses which pressed the two together and vulcanised the adhesive. The material was then stripped off the drum. For use in cars, the loop pile was torn open by a teazling roller and the product is then cropped to give a velvet finish.

The company was at present making carpet from this machine to be offered on the domestic market and known as "Dura-Cord," in which the loops were not open so that the product had the appearance of a typical cord carpet. This process, running for some 20 years, had provided thousands of miles of carpet for the car industry. The plant was on three shifts and only shut down at week-ends. The drums, which constituted the main part of the plant, were manufactured by outside suppliers, but the actual machining and fitting is done at the company's works. Handling these huge drums, which weighed about 60 tons, was something of a problem and they were usually brought to the works early on Sunday morning.

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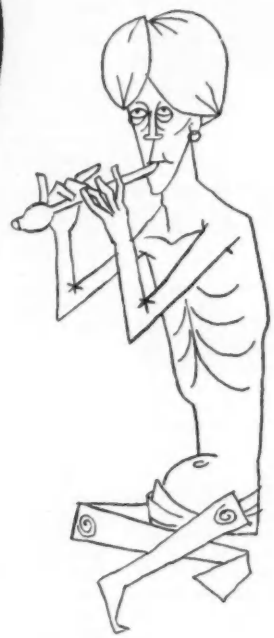

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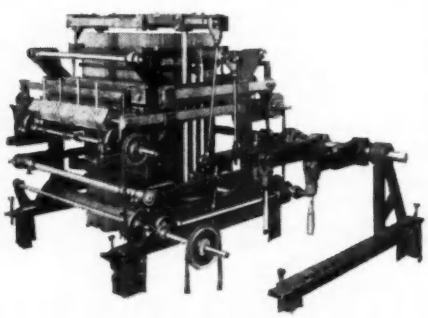

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New Dyeing Assistant for "Tricel"

Used with the disperse class of dyestuffs it extends the range of shades obtainable

A NEW dyeing assistant—Carrier LB—for "Tricel" triacetate fibres has been developed by Courtaulds Ltd. Used with the disperse class of dyestuffs on "Tricel," it extends the range of shades obtainable (particularly heavy shades), reduces the amount of dyestuff required, and increases the rate of dyeing. It also makes efficient dyeing possible at lower temperatures in cases where this is beneficial. Carrier LB is a pale-coloured self-emulsifying oil containing 25% by weight of active carrier principle, with emulsifying, blending, and emulsion stabilising agents. Stirred into water (soft or hard) at 60°C. a finely divided emulsion results which is perfectly stable for relatively prolonged periods at all temperatures upwards to the boil. Carrier LB is an efficient dyeing auxiliary on its own but it must not be used in acid dyebaths and gives optimum results at pH 8 - 9·5.

By itself Carrier LB behaves like an easy levelling disperse dye. It is markedly substantive to "Tricel," and its rate of take-up increases quite rapidly above 65°C. This take-up is readily controllable with temperature. Before use it is essential to ensure that the dyeing vessel or machine is scrupulously clean, since Carrier LB is a most efficient solvent for disperse dyes. To ensure the requisite freedom from old colour, the machine may with advantage be boiled out with a small amount of Carrier LB, in the proportion of 1 oz./gall. on total water in machine, followed by rinsing down. Carrier LB must not be used with azoic dyes, or when applying bases which have subsequently to be diazotised and coupled. Dyeings made with the use of the carrier must not be bleached with chlorine or stripped with chlorine-liberating agents.

Disperse Dyes on "Tricel" with Carrier LB

Most disperse dyes show a marked increase in the rate of dyeing in the presence of Carrier LB. Use of the new carrier also makes it possible to obtain efficient utilisation of dye at lower temperatures (e.g. 80°C. or 176°F.), and this is particularly beneficial when it is necessary to restrict dyeing temperatures during winch dyeing to avoid rope creasing. Carrier LB is of value in dyeing certain heavy shades on "Tricel," particularly when certain slowly diffusing dyes have to be used on account of their unique fastness properties.

Blends of "Tricel"/"Fibro" and "Tricel"/wool

In blends of "Tricel" and "Fibro," Carrier B enables the dyeing temperature to be maintained at a level (around 80°C.) at which crease marks are less prone to develop, and at the same time enables heavy shades to be obtained with dyes which normally have to be dyed at 100°C. In dyeing "Tricel"/wool blends the reduction in the concentration of dyes in the liquor, and the enhanced affinity of the disperse dyes for the "Tricel" component, ensures less staining of the wool by the disperse dyes. This results in improved fastness.

Methods of Application

The direct method is recommended for all occasions, except with certain dyes which are prone to aggregate during prolonged dyeing at high temperatures, even without carrier. 12% of Carrier LB calculated on the weight of fabric is recommended. The dyebath water is raised to 57° - 62°C. and the requisite quantity of Carrier LB added through a sieve to the dyebath. The dyebath is stirred to obtain an even distribution of the newly formed emulsion, after which the dye dispersion is added. Dyeing proceeds in the normal manner.

Since Carrier LB is stable under all normal conditions of dyeing, any dyeing temperature from 65°C. up to the boil can be used. The dyeing temperature employed is dictated by the fabric construction and method of processing. As high a dyeing temperature as is consistent with obtaining a crease-free fabric is advocated. Using 12% of Carrier LB on the weight of fabric, the following will be the concentrations of it at different liquor to goods ratios:—

Liquor/goods ratio	grams/litre concen. of Carrier LB
5:1	24
10:1	12
20:1	6
30:1	4
40:1	3

At higher liquor to goods ratios it is recommended that the initial dyebath concentration of Carrier LB is not lower than 3 grams/litre.

Pre-treatment method—The usual volume of water in the dye-vessel is raised to 57° - 62°C. and 12% of Carrier LB, calculated on the weight of fabric, is added directly to the dyebath and the whole thoroughly stirred to produce an even-distributed emulsion. The pre-scoured fabric, undried, is entered and run for 30 mins. with the temperature rising to the boil, and thereafter for 90 mins. at the boil. The bath is then dropped and a few ends given in clean water. Dyeing with the usual assistants then proceeds in the normal manner.

Carrier LB is obtainable from Courtaulds Ltd., Coventry, in 50 lb. lots contained in 5 gallon (non-returnable) cans. Small sample quantities (2½ lb. or 10 lb.) are available free of charge.

Book Reviews

MOTIVATION RESEARCH. By H. Henry. Crosby Lockwood & Son Ltd., 26 Old Brompton Road, London, S.W.7. 1958 (price 30s.).

Motivation research is a comparatively new marketing tool for use by management which has been dismissed much too hastily by some critics as being merely an "ad fad." Its practical value is as an aid to the formulation of business decisions and policies by its attempt to relate, by psychological and statistical methods, consumer behaviour and hostility to underlying processes, emotions and physical states, thus supplementing rather than displacing more conventional market research techniques.

The author, who has had twenty years' experience in the research field, explains very fully the basic techniques, such as pilot-interviews, depth-interviews and quantifying follow-up, which are employed in M.R. enquiries, and shows how they can be applied in marketing, advertising, production planning and packaging. In a further chapter, Mr. Henry tries to clear up some of the controversial points concerning M.R. as revealed in the writings of its protagonists and opponents. Finally, he surveys the ample literature available on the subject, with particular emphasis on the value to students of the publications of the Advertising Research Foundation of America and the Institute of Practitioners in Advertising. The whole book contains much of interest and help to those concerned with advertising and marketing problems.

S.P.S.

* * *

DIRECTORY OF OPPORTUNITIES FOR GRADUATES 1958. DIRECTORY OF OPPORTUNITIES FOR QUALIFIED MEN 1958. Cornmarket Press Ltd., 1 Lower James St., London, W.1 (price 8s. 6d. each volume).

Final-year students and newly-qualified young people are fortunate in having available two such excellent guides to the choice of careers. The "Graduates" directory, much more comprehensive than the 1957 edition, gives details, arranged according to a uniform plan, covering activities, personnel required, training and prospects of over 220 organisations wishing to employ graduates. The "Qualified Men" directory offers a wide selection of similar entries from companies and other organisations at home and in the Commonwealth. Reference sections in each directory also contain good indexes to organisations tabulated to indicate size, activities and location, and to qualifications showing under different types of qualified people the page references of suitable organisations. Each volume also contains editorial articles by well-known and well-fitted advisers designed to help candidates over interview hurdles and to assess professional opportunities. S.P.S.

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Export Opportunities

Canada:
Grinding, etc., Equipment

A well-known Canadian subsidiary of a large U.S. firm, interested in enlarging their scope in Canada, would like to become associated with suitable U.K. manufacturers either on a sales agency or manufacturing under licence arrangement. The Toronto firm would consider representation of any U.K. manufacturers of suitable lines, complementary to their own products, such as filters, rotary driers, grinding mill liners—manganese and nihard, screen cloth, filter canvas and bags. The firm have been established in Canada for five years but have been doing business with the Canadian mining industry since 1939. Their active sales coverage extends from the Eastern Canadian coast to the province of Saskatchewan and farther west when necessary. Manufacturers interested should write by air mail to the U.K. Trade Commissioner, 119 Adelaide Street West, Toronto, Ontario, quoting reference 11139.

France:
Fishing Nets, etc.

M. J. Morvan, 27 rue Guibal, Nantes (Loire Atlantique) is anxious to represent U.K. manufacturers of steel cables and wire, nylon monofil, sails and sheets of nylon, nylon ropes and braids, fishing and trawling nets of hemp, sisal, manilla, cotton and nylon. He is a representative for rope, sack sail, etc., manufacturers and visits shipyards, maritime establishments, marine suppliers, fishing net manufacturers, sail makers and agricultural co-operatives and wholesalers. Manufacturers interested should write direct, also notify the British Embassy, Commercial Department, 35 Rue du Faubourg St. Honoré, Paris 8e.

Bermuda:
Woollen Material

A. J. Gorham Ltd., Front Street, Hamilton, Bermuda, wish to contact U.K. manufacturers, not already represented in Bermuda, who can supply medium weight wool plaid material suitable for making men's winter shirts and women's skirts. They are an old established firm of commission agents and wholesalers and manufacturers interested should write direct, also notify the U.K. Trade Commissioner, Barclays Bank Building (P.O. Box 393), Kingston, Jamaica.

South Africa:
Worsted, etc. Piece Goods

Lindex South Africa (Pty.) Limited, Plantation House, Pritchard Street, Johannesburg, have informed the United Kingdom Trade Commissioner at Johannesburg that they are interested in and would like to represent a U.K. manufacturer for worsted and woollen piece goods of the medium to better-class, principally for large clothing manufacturers. Founded in 1946, they are manufacturers' representatives, and hold a wide range of textile agencies, principally in cottons and rayons, for mainly U.K. and U.S. principals. Fifteen travellers are employed throughout the Union with a branch at Cape Town; sub-agents are used in Durban and Port Elizabeth. Manufacturers interested should write direct, also notify the U.K. Trade Commissioner, P.O. Box 10101, Pritchard House, Pritchard Street (cor. Von Weilligh Street), Johannesburg.

Western Germany:
Worsted Yarns

The firm of Heinrich Lalk, Wuppertal-Elberfeld, Bismarck-Strasse 53, wish to contact U.K. suppliers of hard worsted yarns suitable for linings, interlinings, upholstery materials, etc. Established in 1947, they are wholesalers dealing mainly in upholstery and furnishing fabrics, curtains, etc. The firm also act as commission agents in yarns and represent a number of German and foreign manufacturers. They also import raw silk from Japan and Hong Kong on own account, and to a certain extent also deal in knitwear and hosiery manufactured by sub-contractors. Suppliers interested should write direct, also notify the British Consulate-General, Dusseldorf, Cecilien Allee 16.

U.S.A.
Tape for Slide Fasteners

Universal Properties Corporation, 328 Healey Building, Atlanta, Georgia, are interested in obtaining urgently from U.K. manufacturers prices for tape $\frac{7}{16}$ ins. wide for the manufacture of slide fasteners. They would like prices for both unbleached and dyed tape, together with samples, and have an enquiry for some millions of yards. It is believed that they have already contacted German and Italian sources. Manufacturers interested should write direct with quotations showing both f.o.b. and c.i.f. prices in U.S. dollars, also copy their initial correspondence to the British Consulate, 422 Hurt Building, Atlanta.

Australia:
Netting

Mr. J. R. Sexton, A.N.Z. House, Edward Street, Brisbane, would like the Queensland agency of a U.K. manufacturer of mosquito netting. He held an agency for mosquito netting for several years but his principals went out of business. He states that as a result of his established position in Brisbane he has ample import licence available and claims to be the second largest importer of mosquito netting in Queensland. Mr. Sexton has been established since 1931. Suppliers interested should write direct also notify the U.K. Trade Commissioner, M.L.C. Building, Corner Adelaide and Edward Streets, Brisbane.

U.S.A.:
Manila and Wire Rope

Mr. Sig Ross, 3150 S.E. 45 Avenue, Portland, Oregon, would appreciate quotations from U.K. suppliers for the following:—

Pure manila rope, $\frac{1}{4}$ to 3 ins. dia., according to the requirements of U.S. Federal Specification TR 601A; three strand and four strand from $\frac{5}{8}$ to $\frac{7}{8}$ ins. dia., in 600, 1,000 and 1,200 ft. coils.

Wire rope, $\frac{3}{8}$ to $1\frac{1}{2}$ ins., 6/19 and 6/25 construction, with hemp centre, and same sizes with independent wire rope centre.

Mr. Ross sells to wholesalers and could give distribution of manila rope in all the western states, in addition to British Columbia and Alaska. Suppliers interested should write direct with quotations showing f.o.b. and c.i.f. Portland prices in U.S. dollars, also copy initial correspondence to the British Consulate, Lewis Building, Portland 4, Oregon.

Switzerland:
Poplin for Theatre Curtains

Luchsinger and Co., Bollwerk 31, Berne, want poplin material suitable for theatre curtains. The width should not be less than 5 yds. and 10 yds. would be preferable. The firm require a 1,000 metres in either white or greige. Founded in 1921, the firm are wholesalers and retailers of piece goods, linings, linen and household textiles. Manufacturers interested should send offers direct, also notify the Branch Embassy, Commercial Department, Willadingweg, 83, Berne.

Mexico:
Blankets and Sweaters

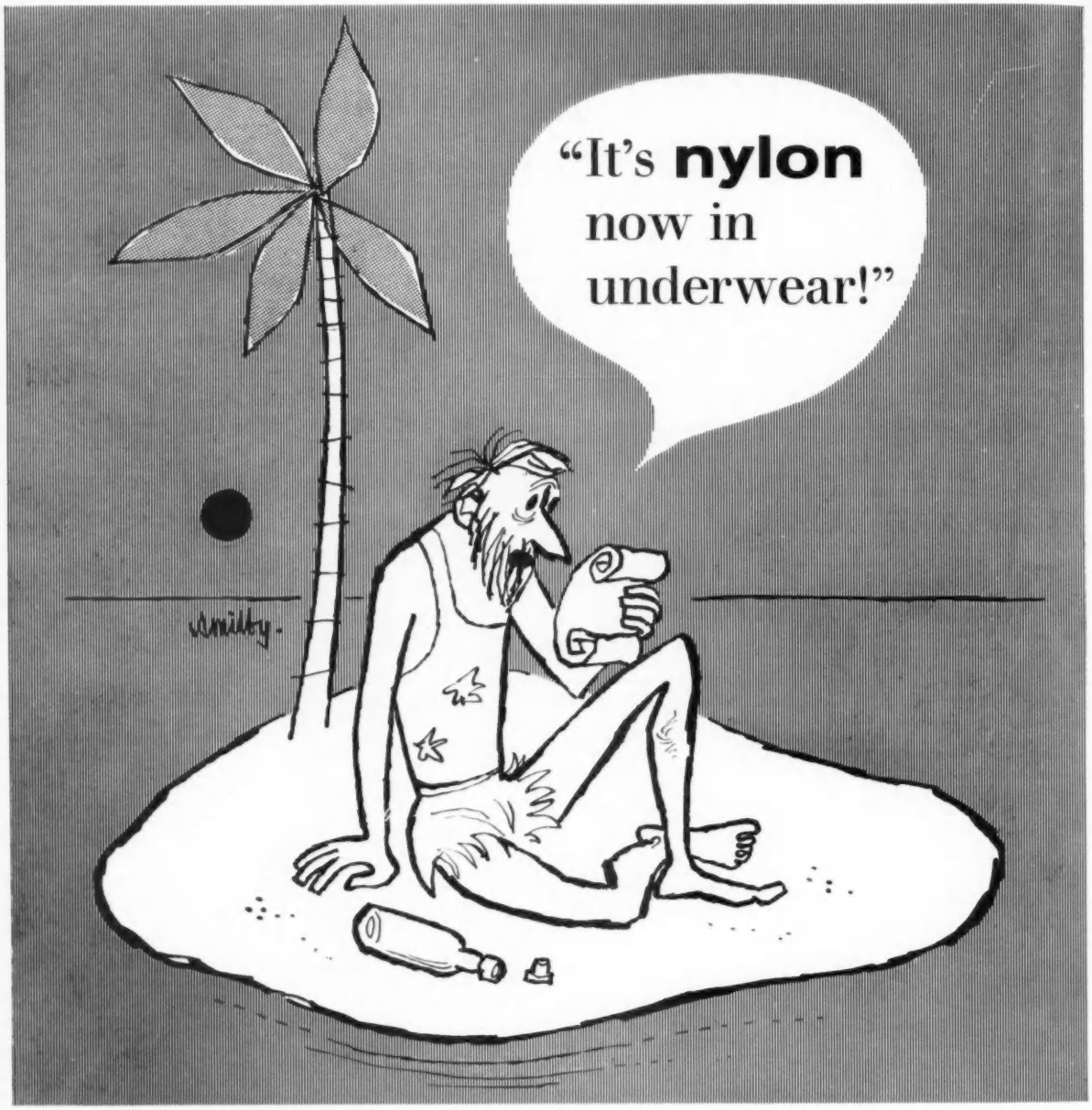
La Estrella Azul, Cia. del Centro Mercantil de la Baja California, S.A., Av. Madero 380, Mexicali, B.C., Mexico, would like to represent U.K. suppliers of good quality blankets and cashmere sweaters. The company have several department stores and firms interested should write direct, also notify the British Embassy, Commercial Secretariat, Lerma 71, Mexico, D.F.

U.S.A.:
Hemp Canvas

Matson Navigation Co., 215 Market Street, San Francisco 5, California, are interested in supplies of hemp canvas, approximately 42 ins. wide, and would like quotations from U.K. firms. Prices should be based on minimum orders of 5,000 yds. Manufacturers interested should write to Mr. J. W. Gibson of the U.S. company with quotations showing f.o.b. and c.i.f. prices in U.S. dollars also copy their correspondence to the British Consulate-General, 2516 Pacific Avenue, San Francisco 15.

N. Rhodesia
Piece Goods

Lafferty and Co. Ltd., P.O. Box 360, Ndola, Northern Rhodesia, would like to represent U.K. manufacturers of printed and plain spun rayons suitable for the African market and furnishing fabrics. Established in 1955 as manufacturers' representatives and distributors. They confine their activities to Northern Rhodesia of which they give full coverage through three salesmen. Manufacturers interested should write direct, also notify the U.K. Trade Commissioner, P.O. Box 984, Salisbury, Southern Rhodesia.



In the uttermost parts they are getting to know that nylon-blend vests and pants are stronger, lighter, altogether more civilised. Here at home, in places like L*i*e*t*r, manufacturers are aware that nylon does something to underwear sales that spreads joy round board-room tables. Nylon with wool? Nylon with cotton? How much of each? Those questions are best answered by our technical people. Say when.

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Textile Trade and Prospects

Cotton Yarns and Cloths

At no time since the 1930's have the prospects in the cotton industry looked gloomier than at present. More spinning mills and weaving sheds are closing—some permanently, others temporarily—and short-time working is becoming more widespread. Business on the whole drags on in a totally unsatisfactory manner and the government's attitude to the problems of unrestricted imports of cotton yarns and cloths is, to say the least, deplorable. The treatment accorded successive delegations to the Board of Trade leads the trade and unions to doubt the wisdom of placing reliance on any worthwhile move by the government. Excuses and meaningless hints at some form of action do nothing to alleviate a state of affairs critical in every sense of the word. Beset by every conceivable production problem the industry struggles on trying to export where it can whilst fighting to preserve the home market in face of rising costs and falling consumption. How can any industry sell its products if the price factor viciously operates against it at every stage in manufacture? Must the industry be compelled to contract to the size where it cannot even supply the needs of a healthy home market? These and many other vital questions demand immediate answers before the damage and consequences of inaction lead to industrial disaster.

Trade at present is pathetic with no sign in the near future of any broadening of demand for yarns or cloth. A fair volume of inquiry has been in evidence but firm business transactions have been very poor indeed. Once or twice, the position has shown signs of improving slightly but these "will-o'-the-wisp" occurrences have quickly subsided into stalemate. Lack of confidence forces buyers to operate only on a day-by-day basis and even then transactions are rather reluctantly finalised in a state of apprehension. Although prices show a slight easier tendency it is not sufficient to create any surge of buying. Inquiries for yarns have covered practically every count and quality in the industry but actual sales have been very modest. Most of the turnover has been for standard weaving qualities, medium count yarns on ring beams, cones and cheeses. Business in the finer combed mule yarns is in the doldrums and even hosiery qualities are not as keenly sought as they were a few months ago. Coarse numbers and condenser types are in slightly better request but in all yarns the demand is very far below productive capacity and no mill can afford to run much to stock in view of the prices and unsettled state prevailing now. Considerable interest is shown in blended varieties of yarns but in many cases the small weights requested can hardly pay some spinners for the trouble involved in upsetting daily schedules often accompanied by processing "headaches." For all concerned, the question of blended yarns should be resolved into "standard types" as soon as possible. With specialities the question has a different aspect and final cost is not usually the most important factor in this category.

Cloth transactions are extremely disappointing. Even early delivery does not tempt buyers to depart from their cautious policy. The bulk of orders, of course, have been for home trade account, the biggest proportion being dress and apparel cloths in all cotton, rayon and blended types in plain, and neat dobby or jacquard designs. Demand for machine and screen printed dress cloths has slackened, a rather unusual thing at this time of the year. The off-take of woven and printed furnishing fabrics has been a little better but still well below the volume that could be supplied and sold if prices were only lower to the consumer. On the present volume of trade, distributive margins in many cases are excessive and should be scaled down. Household textiles move rather sluggishly but there is still steady demand for bright imaginative designs in hand and bath towels. In export markets, a trickle of goods have gone through to one or two continental outlets and a few African markets.

U.S. Wool Quota Decision

President Eisenhower's extension of the U.S. quota on woollen fabric imports for another year has disappointed Scottish woollen manufacturers. Leaders of the industry have discounted the concessions made as being of such a minor nature as to leave the position virtually unchanged. The President's request for a special review and early report on alternatives to the quota system is welcomed.

Mr. J. Douglas Hood (vice-chairman, National Wool Textile Export Corporation and leader of the British delegation at the Washington tariff hearings in December, commented: "We are greatly disappointed by the decision though we take hope from the fact that the President has asked for alternative methods to be investigated. We are certainly going to continue fighting the tariff quota system. Its operation is such that it creates the maximum uncertainty in the minds of both exporters and importers and has reduced business to something near chaos. The quota was introduced as a form of protection for American domestic manufacturers, but the point is that British woollen cloth in no way competes with that made in the U.S. The real competitors are Japanese cloths and the American synthetic fibres industry, yet the quota works in such a way that British manufacturers are the most badly hit."

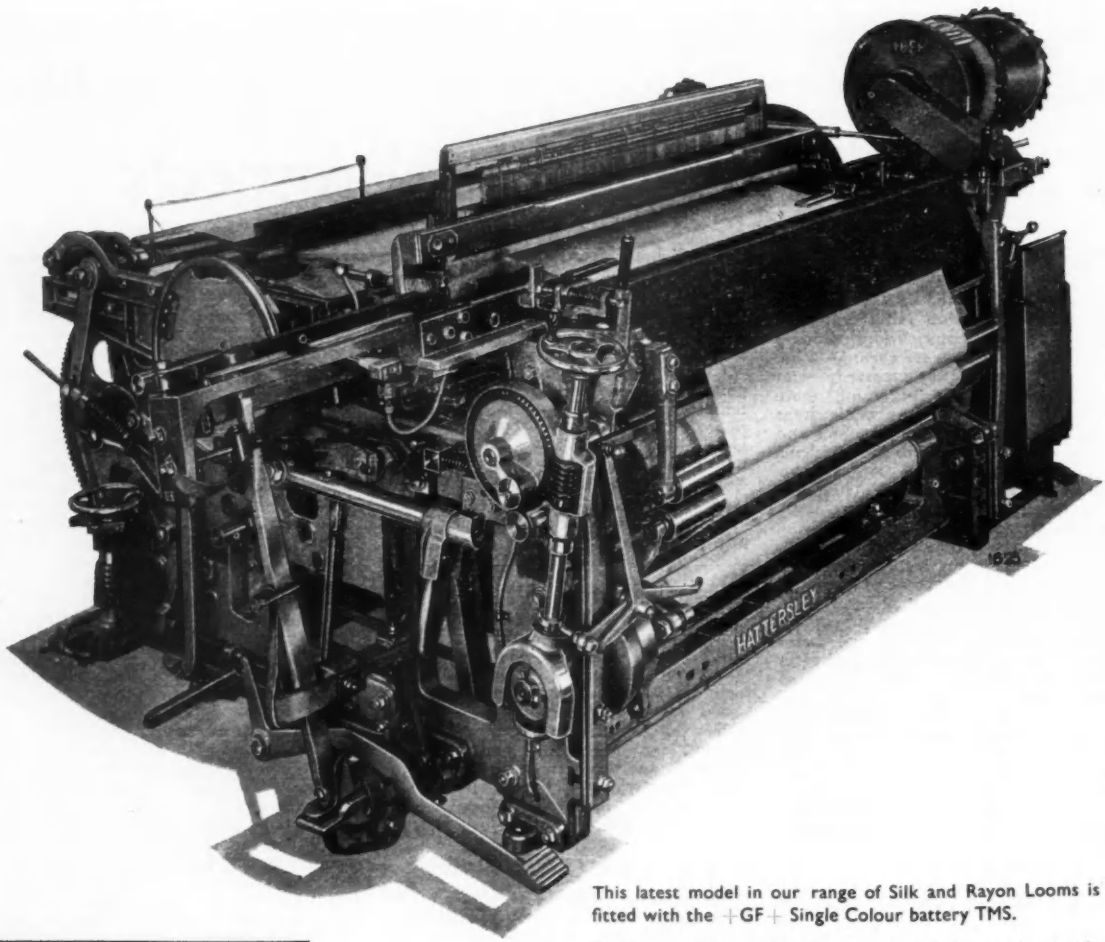
Mr. J. R. Scott-Noble (president, National Association of Scottish Woollen Manufacturers, said: "The President has increased the quota slightly compared with 1957, but it is so small as to have practically no effect on the prosperity of Scottish mills. From that point of view the decision will be very disappointing to the Scottish tweed industry. Certain small concessions have been made in the rate of duty and while these are welcome, they will affect only a very small proportion of our members. By his request, it seems the President recognises that the working of the quota is unsatisfactory. That, if nothing else, gives some hope for the future." N.B. The President has fixed the 1958 quota for imported woollen fabrics from all sources at 14,200,000 lbs., an increase of 200,000 lbs. over 1957. Once the quota has been filled, the rate of duty will rise from 37½ cents per lb. plus 25% ad valorem, to 37½ cents per lb. plus 45% ad valorem. Last year the quota was filled by July 27th; this year it is anticipated the quota will be filled by mid-summer. Exceptions have been made this year in the case of handwoven fabrics and "religious cloths" which will pay 37½ cents per lb. plus 30% ad valorem when the quota has been filled.

The rates of wool consumption, top production and worsted yarn delivery in the U.K. during January were better than in December, states the Wool Industry Bureau of Statistics in its latest returns. In all cases, however, rates of output were substantially lower than in January, 1957. Wool consumption in January, for example, was 5% higher than in December but 14% lower than a year ago. Consumption by the topmaking trade was 13% lower than a year earlier, and woollen trade consumption 15% lower. The worsted yarn delivery rate was 3% higher in January than in December, but 11% below a year earlier, and the woven wool fabric delivery rate was 2% up on December but 6% lower than in January, 1957. The blanket delivery rate was 19% higher than in December, but 6% down on January a year ago. Output figures for January, with 23 working days, were: wool consumption 41·36 million lbs. (clean); top production, 27·17 million lbs.; tops drawn, 19·04 million lbs.; worsted yarns delivered, 19·66 million lbs.; woven wool fabrics delivered, 35·46 million sq. yds.; blankets delivered, 2·76 million sq. yds.

Linen Trade Review

With the time for preparation to sow now at hand flax crop prospects for 1958 in West European countries are unfavourable. Growers and processors have been unable to obtain a working margin between the upward trend of production costs and current market values for fibre. In many instances substantial losses have been incurred on the 1957 crop. Add to this uncertainty regarding the intentions of the Soviet government in the matter of flax exports, and it is understandable why many producers at home and abroad have decided to cut their risks on the 1958 crop.

This prospect has caused concern in the spinning section, for while the total fibre available in recent years has been equal to requirements the selection, particularly in the top grades, has been disappointing and



NEW

Automatic PIRN CHANGING Silk & Rayon LOOM

This latest model in our range of Silk and Rayon Looms is fitted with the +GF+ Single Colour battery TMS.

The Loom illustrated is fitted with 4-shaft positive inside treading with rigid linkage, snap-on connectors, and no springs. Alternative treading arrangements include 10-shaft Cam box, or 25-shaft Dobby with either paper card or lags and pegs, or a Jacquard.

Let-off is by Bartlett system, with oscillating back rail. Alternatives include negative, or Epicyclic Vernier Automatic.

The Hattersley range of Automatic Looms for weaving Rayon and other filament yarns are available, in either Pirn change or Shuttle change form, for one, two, or four colours of weft. The non-automatic versions are either 2×2 box or 4×4 box pick at will.

Four different models in this range can now be seen weaving in our Showroom at Keighley.

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has limited the field of experimentation in the production of quality and novelty lines which are becoming increasingly important to the economic well-being of the industry.

The problem offers no ready solution and certainly calls for closer co-operation between flax processor and spinner than exists today to provide the manufacturing industry with raw material at a price that will make linen competitive with its rivals. The fields in which this is possible are contracting as production techniques in the industry permit few economies in consequence of the variable nature of the fibre. Man-made fibres can generally be tailored to specific requirements, and by reason of their high degree of uniformity they also provide opportunity for short cut processing.

The Flax Development Committee has, belatedly, issued a booklet on "Progress in Flax Growing" in an endeavour to revive growers' interest. Appearing, as it does, when plans for this season's cropping have already been made by most farmers it can have little influence on the 1958 acreage. Indications are that this will be even lower than last year in Ireland. Reports from West European flax growing areas also point to a probable decline in 1958 crop acreage consequent on losses incurred last year. The problem of raw material supply and price has now reached a stage at which the future of the linen industry hinges on a satisfactory solution being found. This is mainly the concern of the manufacturing section as the grower has an alternative in diverting production to more remunerative crops.

When criticizing the Government at Westminster for its failure to protect the interests of the linen industry Mrs. M'Laughlin, M.P., West Belfast, stated that exports of the types of linen made principally in N. Ireland had declined in value from approximately £18 million in 1954 to £15,770,000 in 1957. The industry was facing competition from Iron Curtain countries which exported linen at prices far below the production cost in the U.K. She believed there was a fair case for using the anti-dumping law. Textile manufacturers in Great Britain and N. Ireland were afraid the Government had decided that textiles were an expendable industry. Replying for the Government the Minister of State, Board of Trade, suggested modernisation, re-equipment and design as remedies to meet the difficulties of the industry. Serious thought should also be given to the possibilities of co-operative selling abroad.

Need to improve design was also stressed by Sir Gordon Russell, director of the Council of Industrial Design, when speaking at a Press Conference during his recent visit to N. Ireland. He suggested that linen could be used more imaginatively. He believed that there were sections of the linen industry more design conscious than in the past, but the designer was still not regarded generally as the important person he really was.

Many progressive minds are inclining to the view that the role of re-equipment in reviving the fortunes of the industry is less important than has been suggested in the past. With consumer interest centred more and more on novelty and quality lines, with relatively short runs, together with the variable nature of the raw material, it is extremely difficult to obtain the measure of standardisation necessary to ensure economic operation of modern high speed and automatic machinery.

Jute Fibre, Yarn and Cloths

It is expected that the carry over of jute in East Pakistan at the end of this season will be larger than expected, but the bulk of this will be low quality fibre, which should have little effect on prices being quoted here. So far as the U.K. is concerned the quantity of cuttings and grade Hearts which spinners can use is very small in comparison to other grades. Practically no offers of raw jute have been made via Calcutta this month and this has certainly reduced the quantity of jute available. It may take a little time before firms are organised to make all their offers from Pakistan and, of course, this will possibly stop speculative offers being made.

Some buying interest has been shown by U.K. spinners since prices advanced, and business has taken place in spot, afloat and shipment parcels. No offers are being made at under E.P.C. levels and quotations are £110 for Mill Firsts, £95 Mill Lightnings, £84 Mill Hearts and £71 grade Hearts, c.i.f. U.K., Mar./Apr. shipment. Grade Tossa-2/3 advanced to £103 and grade Tossa-4 to £97, with Outport Tossa-2/3 at £91. Crack Daisee-2/3 is available at £96 and grade Daisee-2/3 at £89, c.i.f. U.K., Mar./Apr. It appears that Pakistan will be able to maintain prices for raw jute for the remainder of the season and the lowest prices for some grades are already higher than E.P.C. levels. Demand from the Continent has been steady with buying more or less confined to essential requirements. Stocks held by Continental spinners cannot be large and this type of purchasing raw material may extend throughout most of the season.

Although spinners and manufacturers are anxious that some reduction should take place in prices of raw jute to make yarns and cloth more competitive with other materials, the attitude of Pakistan is, that she can sell the bulk of her crop at the present price level and until there is a substantial falling off in demand, there is no reason why prices should be reduced. It is very necessary for Pakistan to increase as much as possible her intake of foreign currency and that is her policy at present. Since prices of raw jute have become firmer there has been some improvement in demand for yarns and cloth in Dundee. It is now quite obvious that there is no prospect of any reduction in yarn and cloth rates. Present U.K. yarn and cloth prices have remained unchanged since last December.

The biggest improvement in demand has been noticeable in the heavy end of the trade with sackings, tarpaulins and brattice cloth attracting more attention. Production in Dundee and district is still below normal but there has been a fair improvement in some directions. The carpet trade is taking regular deliveries of yarns likewise the linoleum industry. It was announced in February, that the Indian Jute Mills Association had agreed to minimum prices for the sale of goods by mills in India. This was reflected in an increase in price. The minimum prices fixed are Rs.39·5 for 10 oz. 40 ins., Rs.29·75 for 7½ oz. and Rs.100 for B twills, f.a.s. This is equal to approximately 60s. 5d., 45s. 7d. and 153s. 8d., respectively in sterling f.o.b. Although these prices have been agreed to they are for sales by the mills, and as speculators are bound to have contracts already placed for forward delivery, it may take a few months before cheaper stocks are cleared. Speculators holding cheap stocks could take fair profits and still sell at under minimum rates. However, this will end in due course. Quotations are made at 60s. 2d. for 10 oz. 40 ins., and at 45s. 3d. for 7½ oz. with 11 oz. 45 ins. at 66s. 9d. per 100 yds. f.o.b. Calcutta for March shipment; B twills are quoted at 152s. 1d. March. The Indian Jute Mills Association say this action had to be taken as prices had fallen to an uneconomic level not warranted by the statistical position. The fall in prices was also causing embarrassment to traders, and above all the confidence of overseas buyers in the Calcutta market was being undermined.

Man-Made Fibres and Fabrics

Business has undoubtedly been patchy during the past month, and Lancashire finding only fair demand for traditional cotton fabrics has had more encouraging enquiry for blended fabrics of "Terylene"/cotton and these types will play an increasingly important part in the future output of the industry. Viscose and acetate rayon fabrics are in fair demand, and dress fabrics enhanced with the latest finishes find reasonable outlets overseas. Home sales of furnishing fabrics are moderately good and these have had a little better support in one or two export markets. Smart dobby and jacquard patterns arouse most interest with screen and roller printed designs providing a remarkable range in which blends are proving an important factor in sales.

Lancashire spinners have experienced a fair response from the Midlands for nylon/cotton yarn and "Terylene"/cotton and rayon/cotton blends are in steady demand. Yorkshire sections are finding trade more difficult than for some time. Indeed, a limited amount of short-time working is reported with a decline in demand for certain types of suiting cloths. In the case of woollens business seems to have increased in certain lines and the demand for some coating cloths is certainly more satisfying and stimulating than for some time. Price of course is an important feature and in the cheaper ranges wool/rayon blends are selling reasonably well. Wool/"Terylene" worsteds continue to find steady support and the newer acrylic fibres are also selling well in blends of different proportions.

The Leek trade is finding business difficult. Smallwares are quiet with comparatively little prospect of any immediate improvement. Activity in knitting sections is more promising but even so, business is not easy. Spring showings certainly did not bring in the response expected and advance autumn showings have been equally disappointing. One of the most disturbing factors has been the fall-off in demand for lingerie fabrics. This section of the industry has enjoyed a profitable period if indeed, a competitive one, but demand is reported to have slackened.

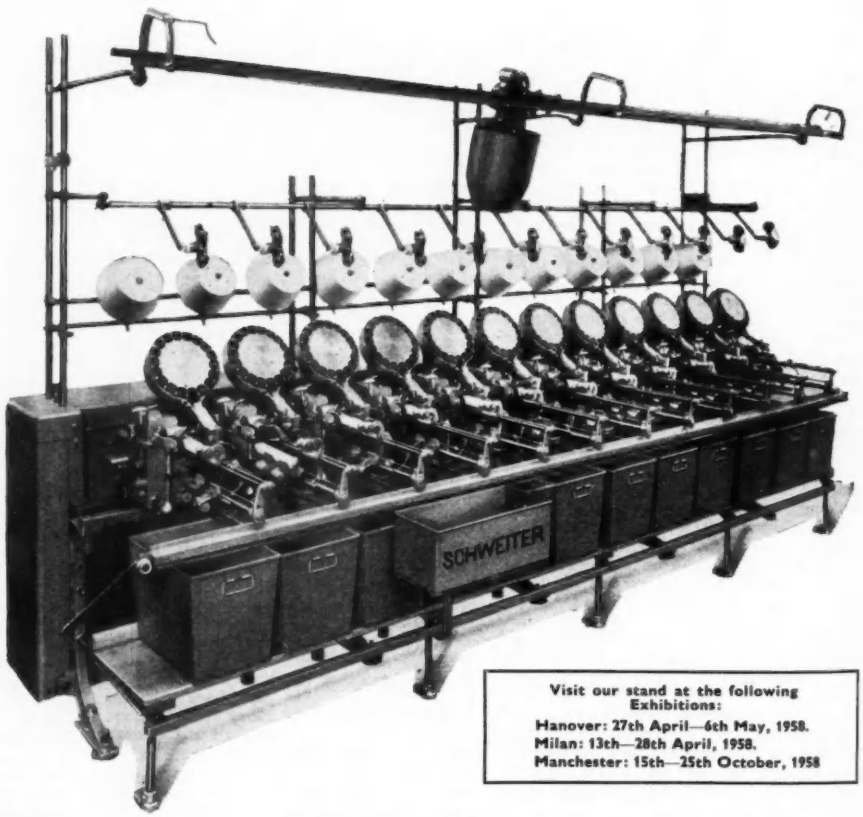
The Macclesfield trade is similarly inadequately employed on the whole. Commission dyers and finishers are reasonably well engaged but screen and machine printers are quiet; only hand-block printers appear satisfied with the present state of affairs. Probably the most active area at present is the Midlands where knitters, despite overseas' competition, report reasonably filled order books, and the mass production part of the trade is finding steady business—chiefly of a replacement at the expense of seam-free styles.

SCHWEITER LTD

HORGEN - (Zürich) Switzerland

Automatic Supercop-Winder

TYPE MTS



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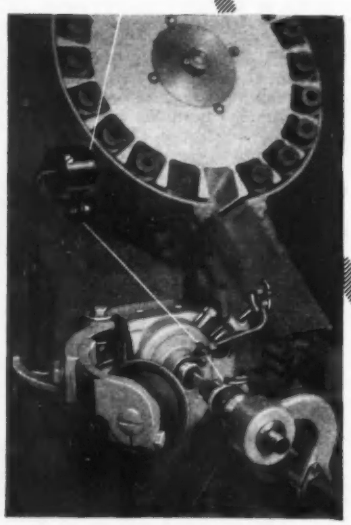

A brand new automatic supercop-winder on which supercops can be produced as they are used on mechanised looms.

It is designed to wind the supercops either with or without reserve winding.

It is extremely simple to handle and its functions are fully automatic.

Each unit of the apparatus works independently with stop motion at broken end.

This new type MTS is the latest design of an apparatus that has given excellent service and extreme satisfaction since we first introduced it twenty years ago.

It automatically produces cops of up to 13¾" in length and wound diameters of 1"—2".

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Notes and News

Machine for making Cut Pile and Loop Pile

A NEW kind of tufting machine is being manufactured by Cobble Brothers Machinery Co. Ltd., Gate Street Works, Blackburn, for producing throw rugs with patterns defined by areas of cut pile and loop pile. These contrasting areas are made by having every other needle in the machine act to make loop pile and all the alternate needles set to make cut pile. The machine is provided with the firm's standard universal type pattern attachment to control the yarn fed to the loop pile needles, and an auxiliary yarn feed to feed the yarn to the cut pile needles. The cut pile is run at a uniform height which is intermediate, and the high and low pile run on the loop needles controlled by the pattern attachment. In the resulting fabric the high loops in the loop pile area cover the cut pile, and the cut pile, covers the low loops in the contrasting areas. Usually, the cut pile is run in solid colour and the loop pile in harmonising tweed, or conversely, and the rugs present a striking appearance.

This machine has only a single needle bar, and a single hook bar which holds both the loop pile and cut pile hooks. The cut pile hooks are mounted in normal fashion and operated in conjunction with knives to make cut pile in the usual fashion. The loop pile hooks are of special design and work in conjunction with a loop stripping mechanism which causes the yarn loop to shed off the hook, and precludes the necessity for having a separate hook bar and driving mechanism for the loop hooks. This machine is claimed to have unlimited pattern possibilities, also that the mechanism is so simple and readily accessible that it is no more difficult to operate and service than a plain cut pile machine. This innovation can be incorporated into machines of any width up to 120 ins.

U.K. Trade in Wool Tops

Wool top exports from the U.K. in January were among the highest ever recorded. The month's figure of 7·8 mill. lb. has been exceeded only three times in the past five years. Of the total, 4·8 mill. lb. were merino tops, and 2·9 mill. lb. other qualities. Imports of wool into the U.K. in January amounted to 61·4 mill. lb. (actual), the lowest January figure recorded for some years and about 25% below that for the beginning of last year. British wool cloth exports are recovering, partly as a result of the temporary restoration of lower U.S.A. duties under that country's import quota. British exports during January were 9·1 mill. sq. yds., compared with 9·5 mill. sq. yds. in January last year.

Stocks of wool in the U.K. at December 31—the most recent date for which official figures are available—totalled 232·8 mill. lb. (clean weight), comprising 88·1 mill. lb. in merino and 144·7 mill. lb. in other qualities. The total was 1 mill. lb. lower than a month earlier, and 21 mill. lb. lower than a year earlier. Taking into account the partial liquidation of the U.K. government stockpile during 1957, however, the reduction in trade stocks of wool compared with a year ago is only 3·6 mill. lb.

Design Contest Success

An important design award has been won by a 20-year-old student at the Scottish Woollen Technical College, Galashiels. He is D. H. Brown, of Sprouston Road, Kelso, and he receives a R.S.A. industrial art bursary in dress textiles—the first of its kind ever awarded to a student at the Galashiels college. To secure the bursary he designed and produced on a hand-loom, within 24 hours, three pieces of women's wear fabrics. In addition he was required to submit four other ranges, a total of twelve patterns.

Mr. Brown, who was educated at John Watsons' School and Daniel Stewart's College, Edinburgh, becomes an Associate of the Royal Society of Arts, and on reaching 25 will automatically become a Fellow. Dr. J. G. Martindale (principal, Scottish Woollen Technical College) commented: "Everyone at the college is delighted with Brown's success. The bursary will enable him to spend six months in America or on the Continent studying design methods."

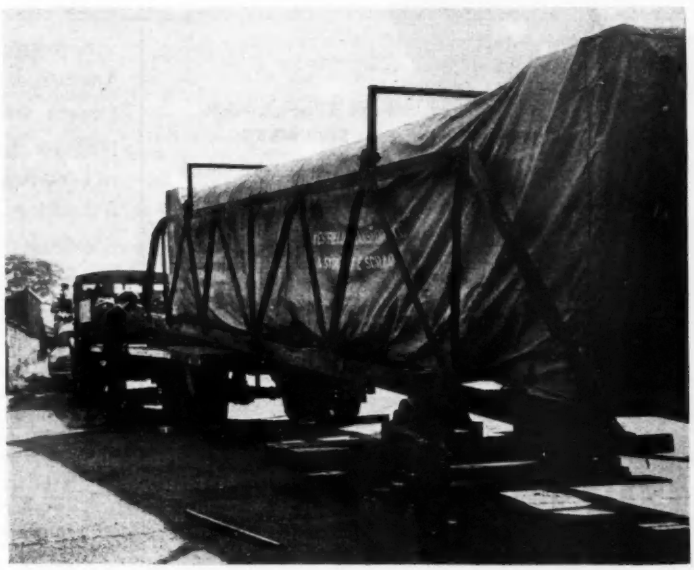
Record of 150 Million Sheep

Australia's sheep population has risen to the record figure of 150 million, or one-sixth of the world's total, reports Radio Australia News. This remarkable increase is attributed to better sheep husbandry, pasture improvement and management, higher lambing percentages and a general advance in the skill of woolgrowers.

Proofed Nylon Helps to Speed Deliveries

Made-to-measure proofed nylon covers are being used to protect large textile machines during their journey from the manufacturers' premises in Macclesfield to customers' mills. By using proofed nylon over a steel skeleton framework it is possible to deliver the machines as complete units instead of in parts. A 200-spindle machine, 40 ft. long, shipped recently to Greenville, South Carolina, was ready for operation inside 48 hours of completing its 3,500 mile journey.

The proofed nylon covers are tailor-made for the job and are designed with an overlap in the centre to allow for variations in the length of the machine according to the number of spindles. The fabric is $7\frac{3}{4}$-ozs. PVC-proofed nylon. It was chosen because it is not only tremendously strong but light in weight and completely impermeable and so provides protection against the weather. Proofed nylon fabrics with total weights ranging from 4 ozs./sq. yd. to 16 ozs./sq. yd. are now being used extensively for a wide variety of purposes such as tarpaulins, gas-tight covers for fumigation, collapsible tanks for the storage of liquids, sports ground covers and portable shelters for aircraft.



A 200 spindle false-twister made by Sydney and E. Scragg Ltd., at the start of a 3,500 mile journey to the U.S.A., protected by proofed nylon covers made by W. H. Sturgess Ltd., Stoke-on-Trent

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the problem

of leakage

THE PROBLEM OF LEAKAGE from the glands of rotary shaft equipment—pumps, agitators, mixers, etc.—is one that faces every engineer. Dirt, danger, mess, loss of product and time wasted on repacking are all examples of the direct effects of such leakage.

A simple and satisfactory solution is to fit Flexibox Mechanical Seals for the positive prevention of gland leakage. Designs are available for operation over a wide range of pressures, temperatures and speeds extending from full vacuum to 1,000 psig, minus 100°C to plus 350°C and up to 40,000 rpm.

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Tufting Machine at Frankfurt Spring Fair

Mr. H. L. Muschamp at the front of the automatic dial type "Super-Tufter" at the Frankfurt Fair

Tremendous interest was created by Muschamp Textile Machinery Ltd. and Super Tufter Machinery Co. Inc., U.S.A. at the Frankfurt Fair. Not only was it the first time that a tufting machine had been exhibited in Germany, but it was the first carpet producing machine to be shown at this exhibition. One of Muschamp Textile Machinery's customers, Messrs. Nora Weberei G.m.b.H. agreed to show on their stand the latest automatic dial type "super" tufting machine. Mr. H. L. Muschamp, managing director, Muschamp Textile Machinery Ltd., and Mr. J. A. Cobble, Jnr., executive vice-president of Super Tufter Machinery Co. Inc., stated that at no previous exhibition was so much interest shown among German representatives and also those from England, France, Holland, Belgium, and Italy. Working demonstrations were given continuously.

Loom Equipment at German Fair

At the forthcoming Hanover Fair, examples of the company's well-known "Stop-on-Pick" loom brake motion and the "Hudson-Argus" automatic warp stop-motion will be exhibited by Irvin Hudson Ltd., Bradford, on the stand (No. 117) of their agent—Erich Trumpelt, Bayreuth. These specialities have an extensive market in Germany where they are standard fittings on many new German looms.

Warp Stop Motions, Healds, etc.

At this year's exhibitions in Hanover, Milan and Manchester, Grob and Co. Ltd., Horgen, Switzerland, will again display their famous light metal slider weaving frames. These frames can either be equipped with all-metal slide hooks or those with polyamid gliding part. Threaded on these frames are Novo Duplex all-purpose flat steel healds, which can also be supplied in stainless steel.

"Grobtex" frames without slide hooks will also be exhibited; these can be equipped with our "Grobtex" healds with the Grob eyelet or the keyhole type.

Amongst the electric warp stop-motions those for silk (KFW 1000) and for cotton (KFW 1100) will be displayed. The motion for silk can, according to requirements be easily converted to a cotton type or conversely. A new heavy design (KFW 1200) for cotton is also being shown. This is specially suitable for coarse cotton, linen or similar heavy fabrics.

Schweiter Ltd. at German Industries Fair

At the forthcoming German Industries Fair in Hanover Schweiter Ltd., Horgen (Zurich) will show a super automatic pirn winder for cotton, wool, rayon staple, etc., with automatic empty pirn feeding device, dust suction device and packer, also an automatic pirn winder with multi-cell magazine for synthetic yarns, with pirn depositing device. An automatic hollow cop winder for producing hollow cops of wool, jute and linen will be on view in addition to an automatic supercop winder and the "Rapid-Coner", cross-winder for cotton, which has a yarn speed of 1,100 yds./min., for the production of conical crosswound bobbins.

For knitting and hosiery mills:

The "Vario-Coner" cone winder for wool and cotton, to unroll from hanks and to draw from cops will interest knitting manufacturers, as will the "Vario-Coner" cone winder with yarn transport device, to unroll from dyed hanks of fully-synthetic crimp yarn. Additional machines to be shown will be the "Monofil-Coner," a precision crosswinder for the production of pineapple cones, and the "Monofil-Coner," precision crosswinder with yarn transport device, to unroll from dyed hanks of fully-synthetic crimp yarn.

Woollen Spinning Invention

A new British invention, bringing promise of a great increase in the rate of production in woollen spinning, is revealed in the annual report of the Wool Textile Research Council. In the report, the chairman (Mr. A. R. Baines) states that Professor Nissan, on his appointment to the Chair of Textile Engineering at Leeds University, suggested for consideration a number of projects, one of which—described as the twist roller project—so impressed the council with its potentialities that they provided backing for the idea. Briefly, a high speed spinning frame, using the twist roller principle, has been constructed, giving a very high rate of production of woollen yarn of similar quality to mule-spun yarn. A prototype machine has been developed at Leeds, for which a provisional patent has been taken out in the names of the trustees of the council.

The report states that the chief advantage of the unit is its high rate of production of yarn. Tests are now proceeding with a view to obtaining optimum conditions for spinning a wide variety of yarns. Mr. Baines, presiding at a press conference at which the report of the council was made public, said it was not possible to give further details at this relatively early stage of development, but the invention had possibilities in the field of woollen spinning which might correspond to important advances lately made by British inventions in the field of worsted spinning.

New Companies

Moorcroft Manufacturing Co. (Heywood) Ltd. Private. Reg. March 7. Capital £5,000 in £1 shares (2,500 "A" and 2,500 "B"). Towel manufacturers, cotton spinners, doublers and finishers, etc. Registered Office: Schofield Street, Heywood, Lancs.

Melbourne Fabric Co. Ltd. Private. Reg. March 6. Capital £10,000 in £1 shares. Manufacturers. Registered Office: 117 Crafton Street, Leicester.

American Glasstextiles Ltd. Private. Reg. March 3. Capital £10,000 in £1 shares. Weavers, manufacturers, producers and processors of glass fibre and synthetic resin materials of all kinds, etc. Registered Office: 9 Mansfield Street, W.1.

B. E. Karter Ltd. Private. Reg. March 3. Capital £500 in £1 shares Importers, exporters, merchants and manufacturers of rayon, silk, etc. Registered Office: 40 Empire House, St. Martins le Grand, E.C.1.

Spinners (Bradford) Ltd. Private. Reg. Feb. 28. Capital £60,000 in 5s. shares. Spinners, etc. Registered Office: Parkside Mills, Parkside Road, Bradford, 5.

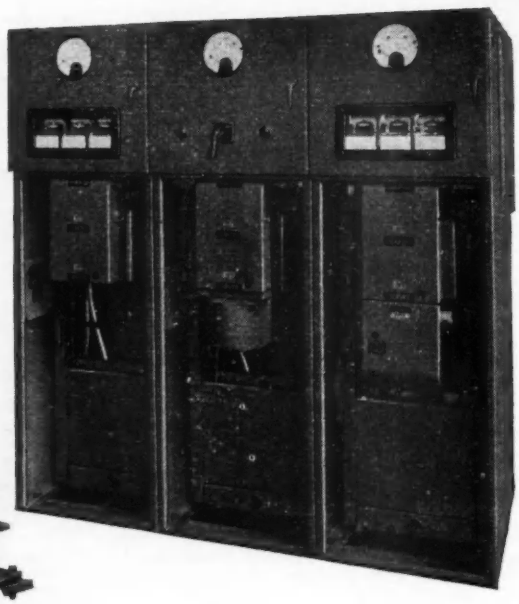
Jacob Cowen and Sons Ltd. Private. Reg. Feb. 26. Capital £90,000 in £1 shares. Cotton wool, wadding, synthetic fibres and plastic manufacturers. Cotton and wool spinners and merchants. Registered Office: Ellers Mill, Dalston, Cumberland.

John Sherriff (Textiles Manchester) Ltd. Private. Reg. Feb. 19. Capital £10,000 in £1 shares. Manufacturers and merchants of cotton goods. Registered Office: 5 Major Street, Manchester 1.

J. F. Johnson Ltd. Private. Reg. Feb. 24. Capital £1,000 in £1 shares. Cotton spinners, manufacturers, dyers, finishers, etc. Registered Office: Scaitliffe Mill, Ormerod Street, Accrington.

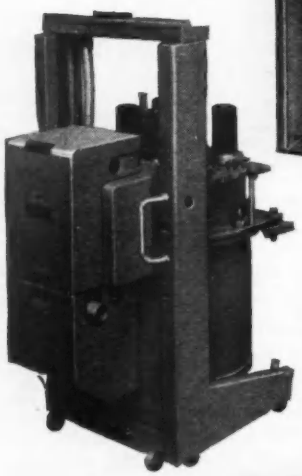
H.V. Metal-Enclosed SWITCHGEAR

150 MVA at 3·3 kV
250 MVA at 6·6 & 11 kV
350 MVA at 11 kV



Type V1H, air-insulated. Type V2H, compound filled. Available for ratings of 400, 800 and 1,200 amps.

Please write for further information.



These three illustrations show the clean design. Cubicle doors open to allow breakers to be pulled forward on their trucks but, in addition, they can be readily removed from their hinges to give full access to the interior without obstructing the space in front of the switchboard.

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RECENT TEXTILE PATENTS

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767,404 Beaming Nylon, etc.

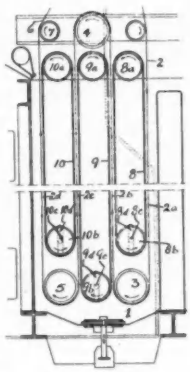
F.N.F. MACHINERY MANUFACTURING CO. LTD., *Burton-on-Trent, Staffordshire.*

A warping machine for winding fine yarns, such as nylon, which are very fragile and easily damaged. The beam is held between a pair of end stocks which are rotatable about a fixed axis and at least one of which has a brake. A sensitive feeler bears against the sheet of warp yarns along a line prior to the sheet arriving at the beam. The movement of the feeler, as the diameter of the warp increases, causes an adjustment of the braking effort available to be applied to the brake.

770,130 Continuous Wet Treatment of Fabrics

J. DUNGLER, 5, *Lange Gasse, Basle, Switzerland.*

Device for the impregnation, in full width and in a continuous manner of fabrics to enable dyeing, washing or similar operations to be carried out. 1 is a vat filled up with a washing liquid, and the material enters the vat at 2 and forms several parallel runs 2*a*, 2*b*, 2*c*, 2*d*, as it passes over the rolls 3, 4, 5, which all may

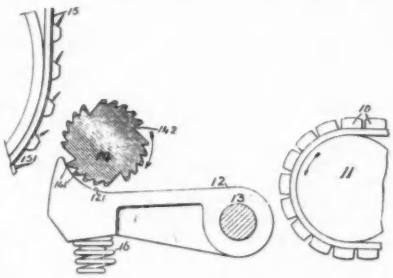


be positively driven. The fabric leaves the machine at 6 while passing over a guiding roll 7. The path of the individual runs of the fabric is bounded by endless bands 8, 9, 10 passing over rolls 8*a*—8*b*, 9*a*—9*b* and 10*a*—10*b* respectively. The rolls 8*a*, 9*a*, 10*a*, are positively rotated whereas the rolls 8*b*, 9*b* and 10*b* are free and their journals 8*c*, 9*c* and 10*c* may freely slide in vertical direction within hollow guides 8*d*, 9*d* and 10*d*.

770,463 Improved Pedal Feed Roller

T.M.M. (RESEARCH) LTD., *Hartford Works, Oldham.*

Improved roller for pedal-and-roller feed mechanism, etc. A conveyor 10 is trained about a roller 11 so that material transported on the conveyor is discharged upon the surfaces of an assembly of pedal levers 12 which are mounted upon a common pivot shaft 13. A fluted feed roller 14 is mounted above the pedals and delivers the material between the tips of its lands 141 and the surfaces 121 of the pedals to the spikes 151 of a lattice 15.



The pedals 12 are urged upward towards roller 14 by individual springs 16. The roller has a number of axial grooves 142 which extend throughout the length of the periphery and are of greater width and depth than the flutes 143 between the lands 141.

770,670 Machine For Felting and Shrinking Felt, etc.

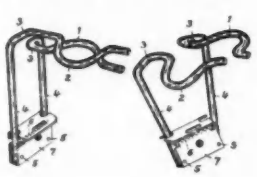
R. D. L. FREDERICK, 1540 *High Street, Glen Iris, Melbourne, Victoria, Australia.*

A method of treating felt and other fabrics to effect felting and shrinking of the material in open width form comprising feeding the material to be treated between a set of conveyor devices to effect the felting operation, and subjecting the material to gradually increasing pressure so that the process is cumulative and to provide for a hardening of the material. The felted material is then fed between a second set of conveyor devices to effect lateral and also longitudinal shrinking, and the material is subjected to gradually increasing pressure during the shrinking operation. The material passes from one set of conveyors to the next in the form of a loop, and the loop is used to control the drive speeds of an adjacent set of conveyor devices.

770,719 Balloon Control on Ringframes, etc.

B. PROSS, 82, *Regentenstrasse, Munchen-Gladbach, Rhineland, Germany.*

Thread balloon restricting device for spinning and twisting machines. The device comprises two members bent at



3 to form two semi-circular restricting arms 1 and 2 and two legs 4 extending downwards from 3 and pivoted at their ends by pins 5. The legs after having been opened move towards each other under the action of a spring 6 which interconnects the legs, and the arms 1 and 2 slide one on the other like shears. The front and rear sides of the lower ends of the legs, together with the spring 6 connecting them are enclosed in a U-shaped sleeve 7.

771,250 Spinning, etc., Machine Building Motion

T.M.M. (RESEARCH) LTD., *Hartford Works, Oldham.*

A building motion for spinning, doubling, and twisting machines. A primary cam actuates a primary lever, and a secondary cam is mounted on the primary lever. A secondary lever is mounted so as to be oscillated by the throw of the secondary cam. A connection is provided between the secondary lever and a yarn traversing member. The secondary lever is mounted on a pivot which is capable of being shifted in relation to the point at which the secondary cam impinges upon the secondary lever in such manner that the effective length of the secondary lever, and therefore the point of reversal of the traverse, may be varied.

771,265 Stripping Weft from Automatic Loom Bobbins

G. E. PROBETS, 6 *Mile Street, Claremont, Halifax.*

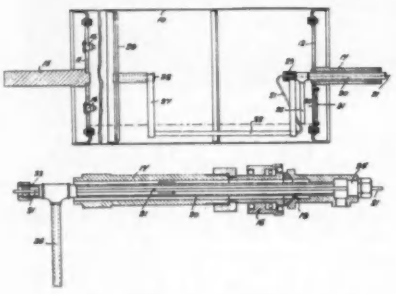
A device for stripping weft from a bobbin which has been discarded from an automatic bobbin change loom and is an improvement on the device described in B.P. No. 708,675. A member mounted on the device is connected to the bobbin change mechanism, and is adapted to engage with a bobbin resting on the nip rollers and discharge the bobbin from the device, when the member is caused to swing about its pivot upon operation of the bobbin change mechanism.

771,442 Temperature Control for Drying Cylinders

THOMAS HOLT LTD., *Atlas Iron Works, Whitworth Road, Rochdale,* F. HOLT AND G. LEE.

Device for automatically controlling the temperature of steam heated drying cylinders. 10 indicates a steam heated drying cylinder and the end wall 11 is furnished with a plain trunnion 15 and with vacuum valves 16. Steam is supplied to the interior of the cylinder through a pipe 17 fixed to the end wall 12, the pipe 17 rotating with the cylinder and serving as a trunnion for it. The pipe 17 has an antifriction bearing 18 and a steam inlet nozzle 19. Inside the pipe 17 is a condensate return pipe 20 through which passes the capillary tube 21 of a thermostatic temperature regulator 22 of the bulb type.

The thermostatic temperature regulator is suspended from the centre line of the cylinder in such manner that the bulb 22 is maintained adjacent to the bottom of the drying cylinder and below the level of the condensate in the cylinder during the revolution of the cylinder. The capillary tube 21 is maintained at opposite ends in sealing glands 23, 24, the projecting



outer end of the capillary tube being connected to the steam valve. Intercalated in the pipe line of the condensate return is a syphon pipe 25, the end of which is at a distance from the bottom of the cylinder commensurate with the desired depth of condensate. The regulator 22 is suspended at one end in a bracket carried from the pipe 20, while at its opposite end it is suspended in a bracket 27 loosely mounted in a carbon graphite composition bearing 28 carried by a spider 29. A hand-hole 30 is formed in the end plate 12 of the cylinder and is closed by a door 31.

771,543 Improved Winding Machine

LINEN INDUSTRY RESEARCH ASSOCIATION, *Research Institute, Lambeg, Antrim, Northern Ireland.*

A machine for winding yarn on to double flanged bobbins, the flanges being of truncated conical shape and each bobbin is driven by surface contact with a drum rotating at a constant speed. The yarn is traversed across the bobbin by a slotted guide pivoted at a point which at the commencement of winding is some distance below the point which lies at the intersection of lines formed by the projection of the lines of the conical flanges, and the guide makes an angular displacement less than the included angle of the two flanges.

771,690 Spindle Lubrication

F. ADLINGTON AND G. W. WHITWORTH, 29 *Throstle Mount, Luddenden Foot, Halifax.*

A spindle lubricating device for a spinning or twisting machine comprises a receptacle for a lubricating pad which contacts the spindle and means within the receptacle for restricting the area of contact between the pad and the spindle.

768,691 Drafting Device

ESTIRAJES BALMES, S.A., *Calle Caspe No. 26, Barcelona, Spain.*

Drafting mechanism for spinning machines, in which a transverse motion is imparted to the rovings while passing through successive pairs of drawing rollers. Means are provided for imparting to at least one of the upper pressure rollers, to and fro motion in the direction of the axis of each roller and in synchronism with the transverse motion of the roving, so that the zone of contact of the roving with the upper rollers is always the same.

771,893 Blended Yarns

YARROW WOOL SPINNERS LTD., D. K. COLLEDGE, W. M. COLLEDGE, AND J. D. COLLEDGE, *Yarrow Mill, Selkirk, Scotland.*

A yarn of improved properties particularly as regards the "handle" of fabrics made from the yarn. The yarn comprises a blended mixture of four different animal fibres, namely lambswool, cashmere, real silk and animal fur, in which the fur and lambswool account for over half the proportion by weight of the fibres, the silk contributing to the strength of the yarn and the cashmere to the "handle". The proportion of the components in the blend may be within the limits: fur 45% to 65%, lambswool 15 to 40%, silk 5 to 15% and cashmere upwards of 4%.

771,928 Warp Stop Motion

EDMOND BAUGNIES, 295 *rue Reine Astrid, Nechin, Belguim.*

A warp stop mechanism for looms has warp breakage detectors consisting of a thin apertured metal blade or of two thin metal wires with an eyelet for the thread and below the eyelet a window aperture for detector bars, and at each end a long anti-fouling rod in order that this detector maintains its place for its whole height whatever the angle of the shed. The rod at the bottom is intended to come into contact with the stop device on breakage of the thread retaining the detector.

772,052 Loom Shuttle Boxes

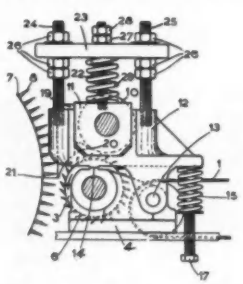
TOOTAL BROADHURST LEE CO. LTD., 56 *Oxford Street, Manchester.*

Shuttle boxes for looms in which the whole or parts of the interior including the swell presents a surface of a thermo-setting synthetic resin which is preferably reinforced with a heat resisting and strengthening agent. In one example, asbestos mat material is immersed in a solution of phenolic or cresylic resin in methylol alcohol solution, the dilution being adjusted so that the asbestos picks up between 30 and 60% of the resin. The material is dried to a pliable condition and moulded on to the swell surface at 130–150°C. for 30 mins. under a pressure of 100–500 lb./sq. in.

772,167 Fibre Opening Machines

LES FILS DE CLOVIS HOTTELART, 23 *rue Richard Lenoir, Roubaix (Nord), France.*

Improved opener in which the material is brought by an endless belt 1, the materials being hooked by the spiked cylinder 3. Mounted on the frame is the drum 7 having

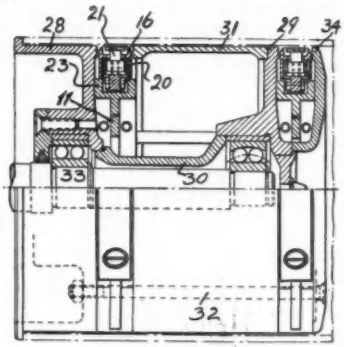


points 8 which pass very close to the points 6 of the cylinder 3. In order that the points 6 may penetrate into the material, the latter is pressed on to the points by the cylinder 10, the spindle of which pivots in bearings 11 mounted so as to be capable of sliding in a support 12. The latter is capable of pivoting at 13 on an extension of bearing 4 on which it bears at 14 due to the effect of its own weight and of a spring 15 whose pressure can be regulated by screw 17. Fixed to the bearings 11, is a trough-shaped blade 19 comprising an edge 20 which scrapes the surface of cylinder 10 and an edge 21 against which abut the materials which are hooked and entrained by the points 8 and retained by the points 6. Bearings 11 have a rod 22 which is slidable in a cross-member 23 fixed to the support 12 by two rods 24 and 25 and nuts 26. Screwed on to the rod 22 are a nut 27 and a counter-nut which make it possible to vary the pressure of spring 29. By acting on the nuts 26 it is possible to adjust the minimum distance from the cylinder 10 to the points of the cylinder 3 and therefore the distance of the trough-shaped blade from the same points.

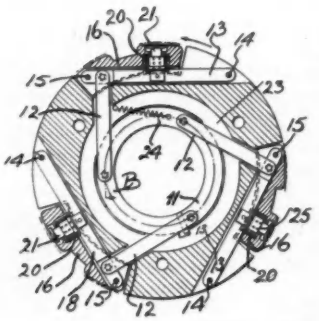
772,318 Bobbin Supports

VEB SPINN- UND ZWIRNEREIMASCHINENBAU KARL-MARX-STADT, 8 *Larchenstrasse, Karl-Marx-Stadt* 31, *Germany.*

Improved bobbin supports for spinning machines in which the bobbin is held in place during spinning by means actuated by centrifugal force. The support comprises bearing carriers 28 and 29, the carriers being spaced by a sleeve 30, the gap between the carriers being partially



closed by a casing 31. The whole is secured together by tie bolts 32, and the support so formed is mounted on the stub shaft 33. Clamped between the opposing ends of the carrier 28 and the casing 31, on the one



hand, and the opposing ends of the carrier 29 and the cover disc 34 on the other hand, there are arranged the rings 23. Each ring 23 provides a mounting for three centrifugal weights 16, the weights being spaced from one another around the ring. Each

weight is mounted so as to be rockable about one end on a pivot pin 15 adjacent to the free end of a lever 13, each of which is in turn mounted on a pivot pin 14. Each weight is urged outwards by a spring 20, outward movement of the weight being limited by a stop 21 the shank of which extends through the spring the stop being secured to lever 13. In the ring is a ring 11 which is connected to each lever 13 by a pair of links 12. Each pair of links is connected to the lever by a pin and to the ring 11 by a pin. Ring 11 is loaded by a spring 24. and is movable relative to ring 23, the action of spring 24 tending to rotate the ring in a direction in which the links 12 pull the levers 13 inwards to hold the same in a retracted position.

772,613 Blending Fibrous Materials
T.M.M. (RESEARCH) LTD., *Hartford Works, Oldham.*

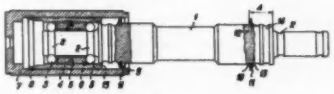
Apparatus for the preparation of blended material, wherein each ingredient is separately subjected to an opening operation, conveyed separately to a reception and delivery unit reserved for the ingredient, and transferred at a metered rate to a conveyor common to all the units, in conditions such that the conveyor receives a uniform dispersion of tufts of each ingredient, the aggregation of tufts constituting a blend which is subsequently removed. Provision is made for the conveyance of opened material from selected members of a number of opening devices to selected members of the same or a less or greater number of reception and delivery units, as desired.

773,211 Roller and Clearer Cards
C. O. MULLENSCHLADER, *Oberwiehl, Cologne, Germany.*

A roller carding machine comprises a frame carrying a main cylinder, carding devices allotted to the cylinder, a doffer, feed mechanism and driving gear for the components, in which the frame is rotatably about an axis parallel to the axis of the main cylinder. This may be achieved by providing the machine frame with two coaxially arranged axle journals and mounting these journals in two bearing blocks. By virtue of the adjustability of the machine it is possible to rock the card and bring those rollers which can be reached only with difficulty in operational position (for example the rollers situated under the cylinder), into a position in which they are accessible.

773,310 Drafting Mechanism
SKF KUGELLAGERFABRIKEN GESELLSCHAFT MIT BESCHRANKTER HAFTUNG, 13 *Ernst Sachs Strasse, Schweinfurt am Main, Germany.*

Improved loose boss roller with means for sealing the clearance between the shaft and the boss. 1 is the roller shaft which has ball grooves 2 with balls 3 on which the bearing rings 4 rotate. Each ring is connected with an intermediate member 6 by a spring ring 5. The boss 7, which is mounted on the ring 4, is prevented from undue inward movement by a spring ring 8. There is a clearance 9 between shaft and boss. To prevent ingress of dirt through



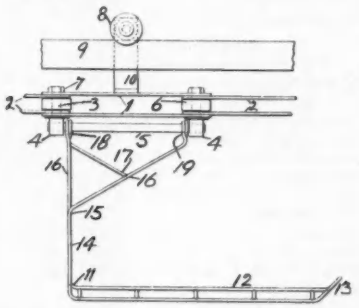
this clearance, the portion "A" of the shaft is slightly turned down to form a shoulder 10 which serves as a stop for a thin sealing ring. 11 The sealing ring is mounted on the shaft and then a groove 12 is rolled into the shaft displacing the material to form a collar 13 which retains the ring in its position. Another groove 14 may be rolled into the shaft in such manner that material of the shaft is displaced to increase the diameter of a portion and bring it back to the diameter it had before being turned down, whereby only a very small clearance 15 is left between the shaft and the inside of ring 4 when the parts are assembled. This arrangement affords a double protection against the ingress of dirt.

773,531 Jet Propulsion of Weft
MIRA, ZAVODY NA PLETENE A STAVKOVE ZBOZI NARODNI PODNIK, 16 *Ctiradova, Prague XIV, Czechoslovakia.*

A method for the insertion of weft into the shed by means of a jet of liquid which carries the weft through the shed. The jet is formed by a nozzle to which the liquid is supplied under pressure from a pump. A piston pump is provided which is designed to supply at each stroke a determined quantity of liquid under pressure to a nozzle in which the jet is formed and in which at the same time the thread is entrained in the jet.

773,532 Hank Conveyors
W. W. SPOONER, "*Ashbrook,*" *Grove Road, Ilkley.*

Describes a form of hank conveyors embodying a series of hank supports spaced along the run of a driven endless chain. The conveyor chain consists of pairs of links 1, 2 connected together by pins 3 having heads 4 which are apertured to receive bars 5 between adjacent pairs of pins. The pins pass through distance



pieces 6 between the links 2 and are secured by nuts 7. Flanged rollers 8 running on a rail 9 are connected to the links 1 by brackets 10 to support the chain from the rail. Hooks 11 are formed of metal wire with a long hank-supporting cantilever arm 12 which is up-turned at 13. The arm 14 of the hook bifurcates at 15 into two subarms 16 braced by a strut 17 and curled at their ends to form eyes 18, 19 in which the bar 5 is received.

774,698 Coiling Slivers in Cans
T.M.M. (RESEARCH) LTD., *Hartford Works, Oldham.*

A method of coiling sliver in a can by feeding the material into the open top by a rotary delivery guide. The coils are so laid as to enclose an axial hole the diameter of which is from one quarter to one half the diameter of the receptacle.

775,067 Loom Weft Cutters
VEREINIGTE SEIDENWEBEREIEN A.G., *Johann-Blum-Platz, Krefeld, Germany.*

A thread cutter for looms, comprises an electrical driving mechanism and a feeler which is displaced by the entry of weft threads into the cutter, to close the power-supply circuit for the driving mechanism. With this arrangement, the cutter need only operate for a very short period to sever the threads, and consequently wear of the cutter and its mechanism is reduced to the minimum.

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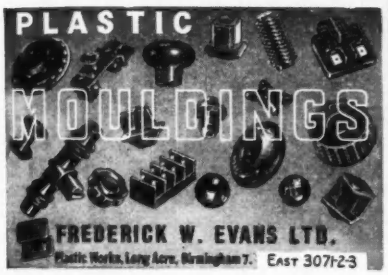

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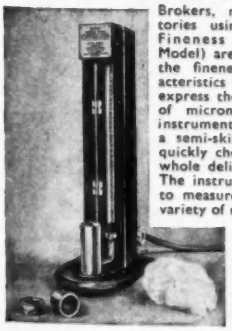

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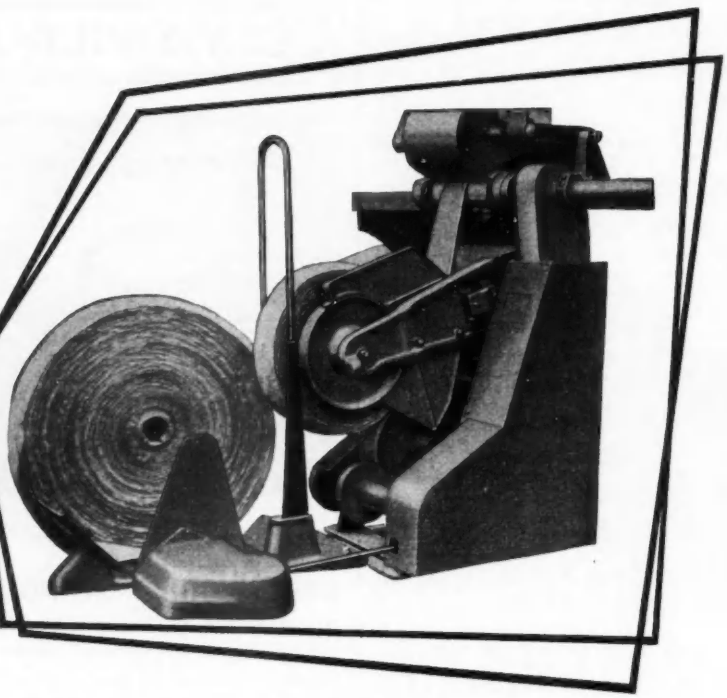

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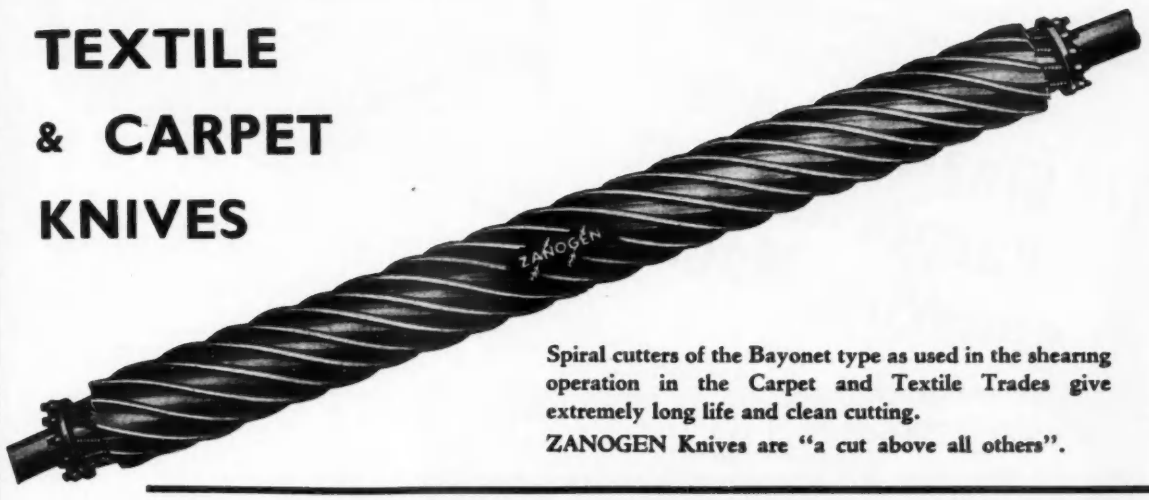

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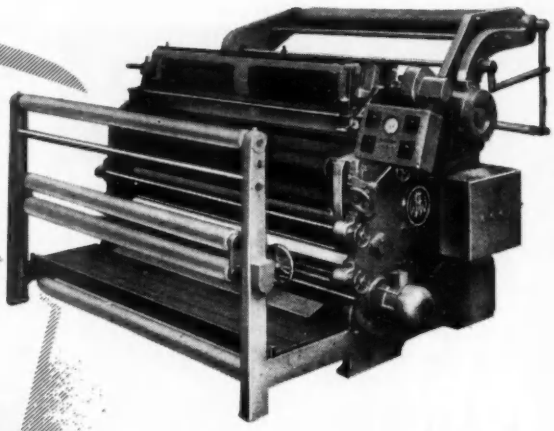

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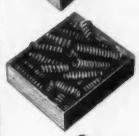

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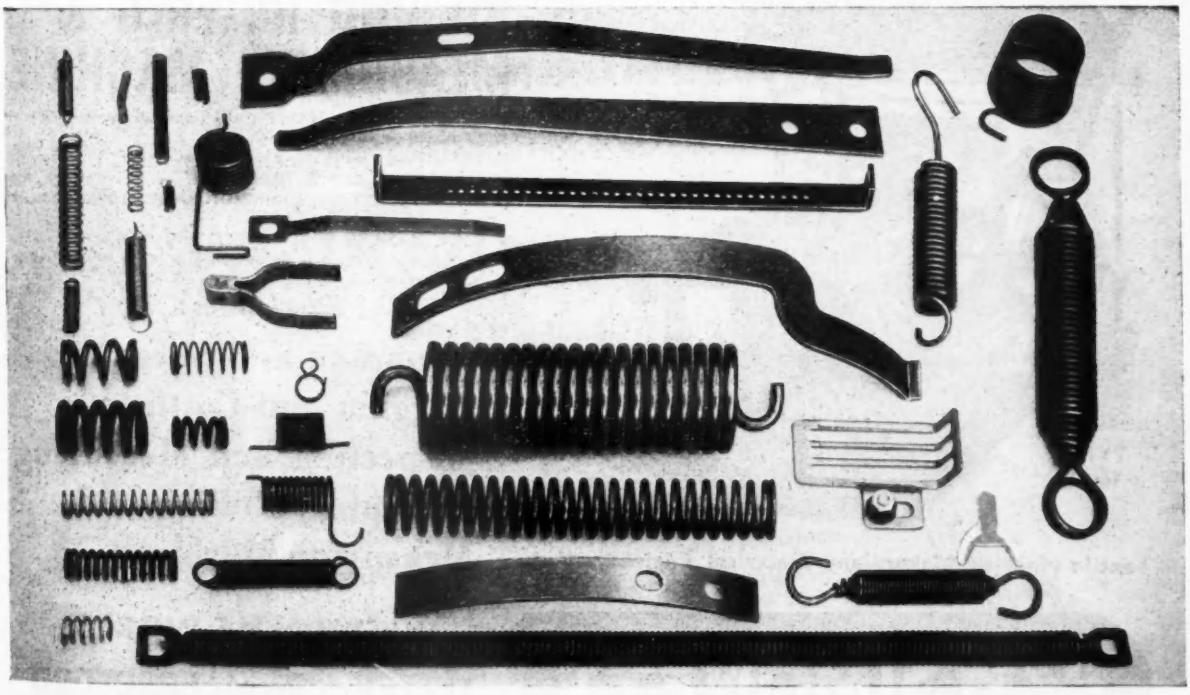

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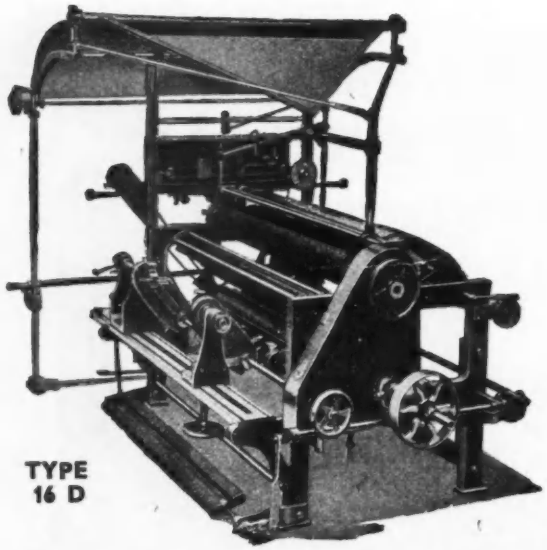

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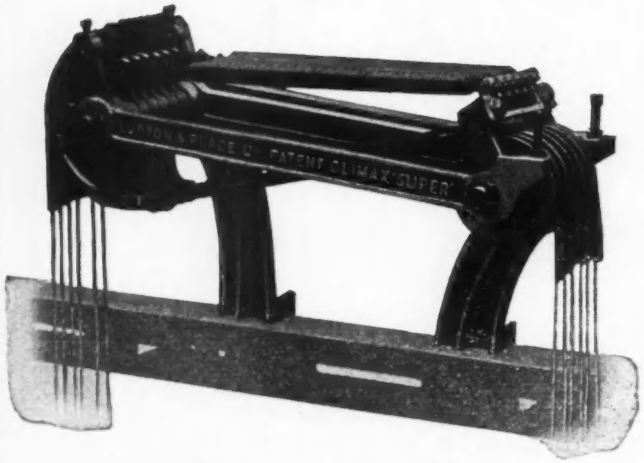

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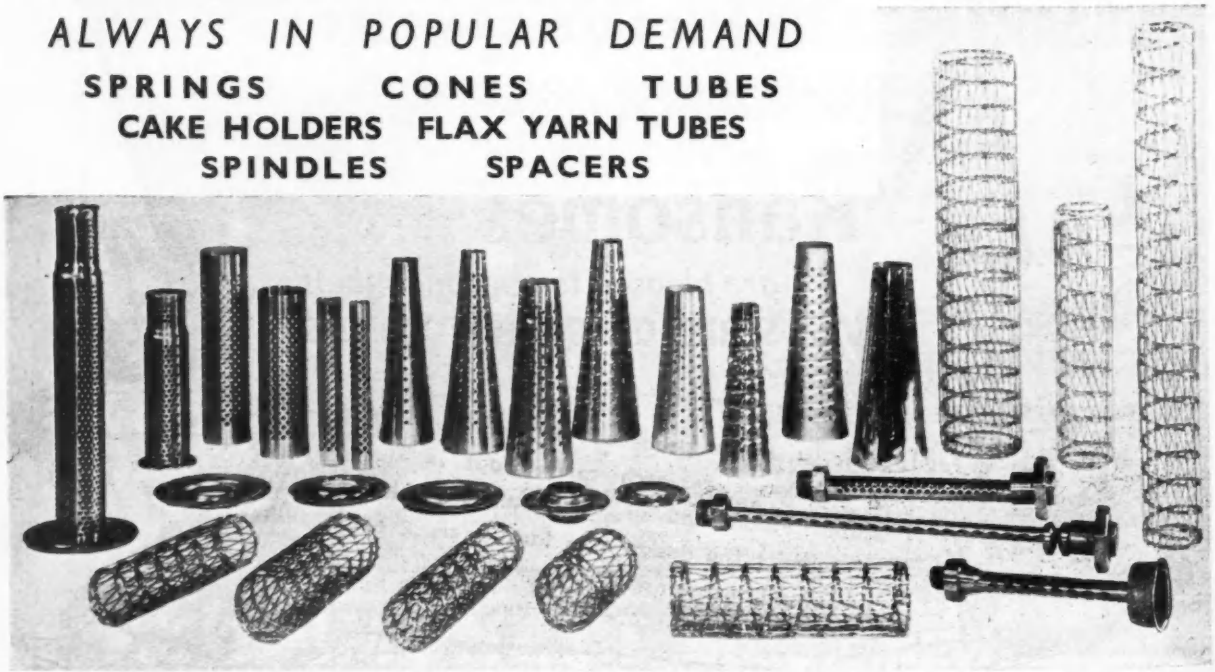

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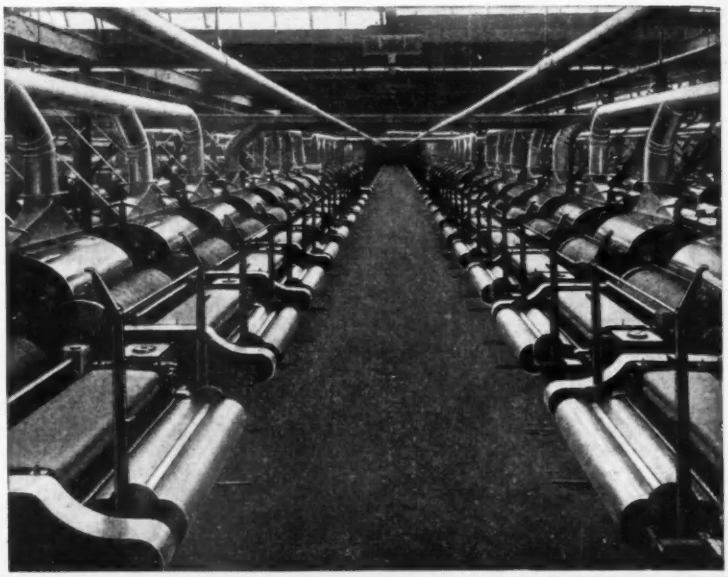

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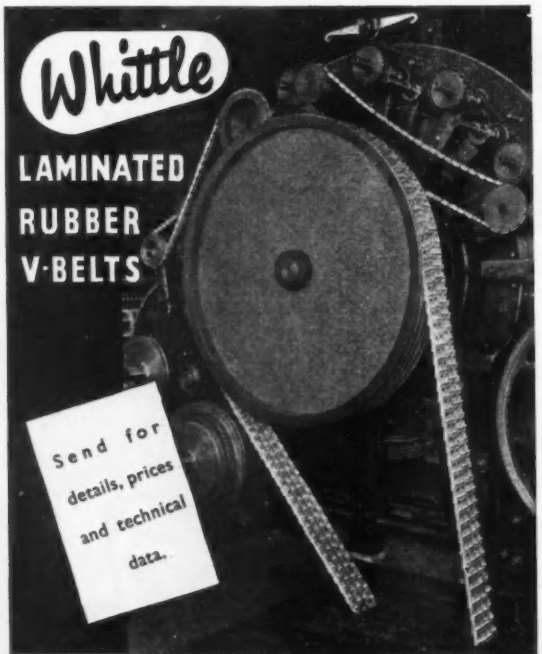

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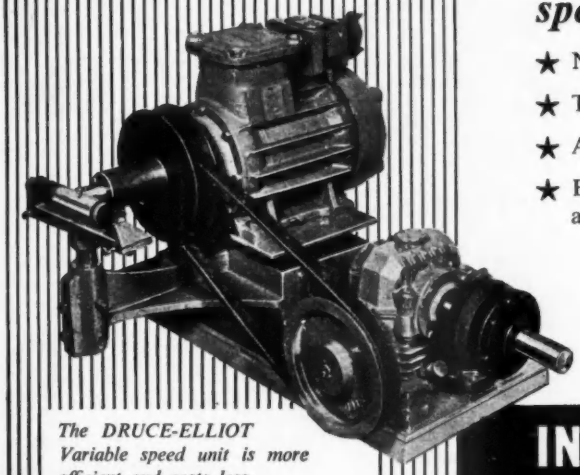

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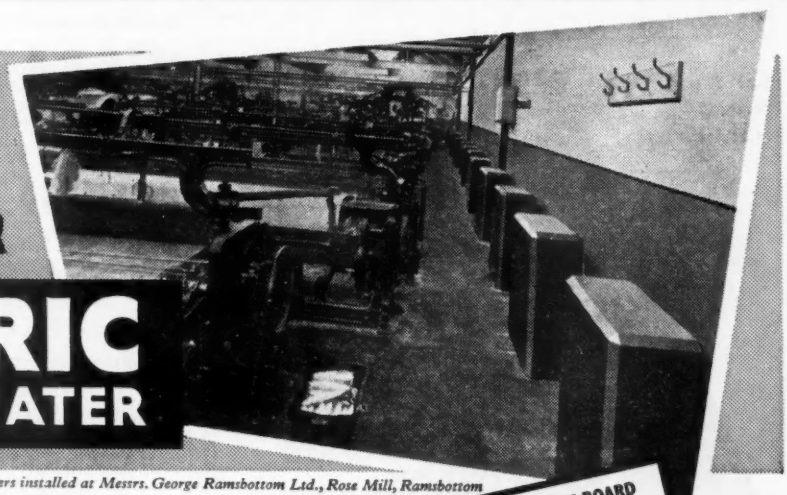

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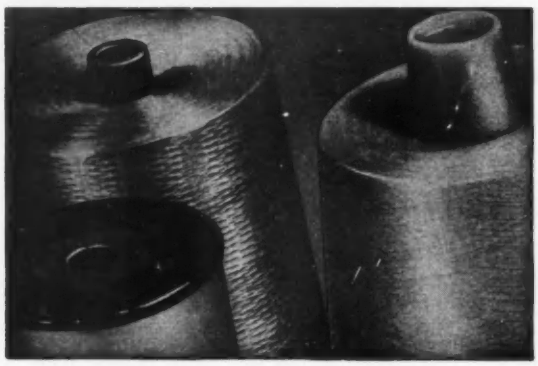

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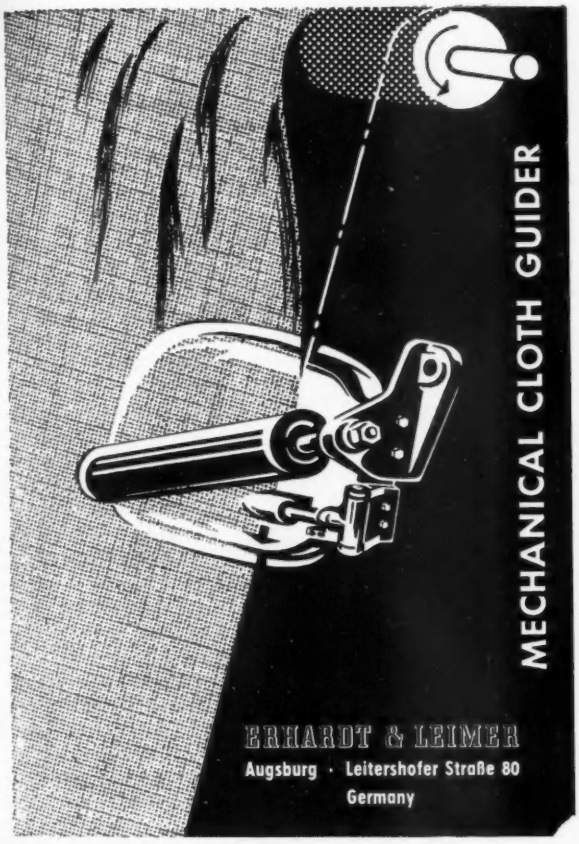

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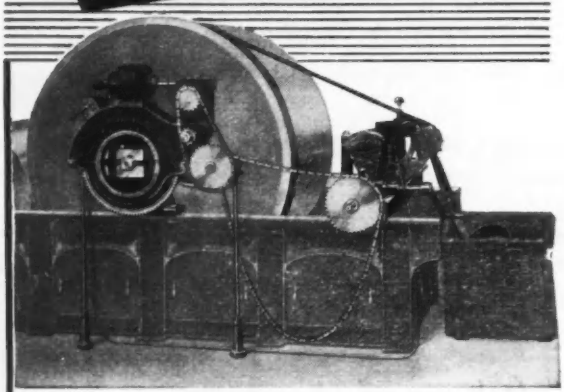

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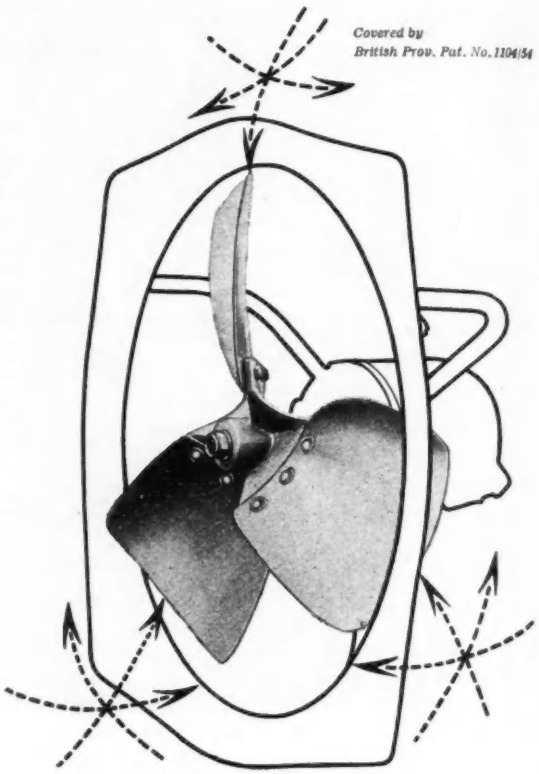

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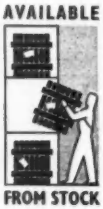

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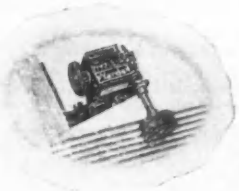

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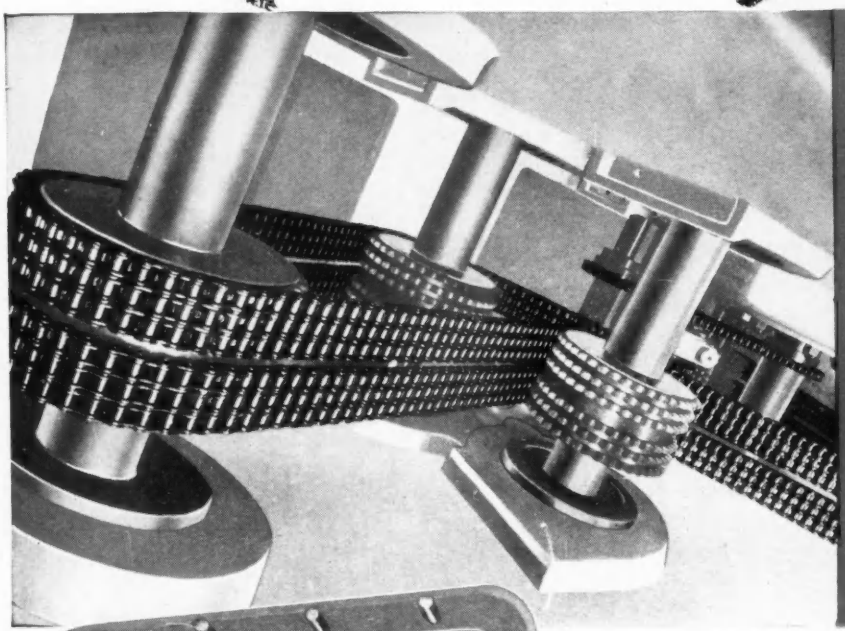

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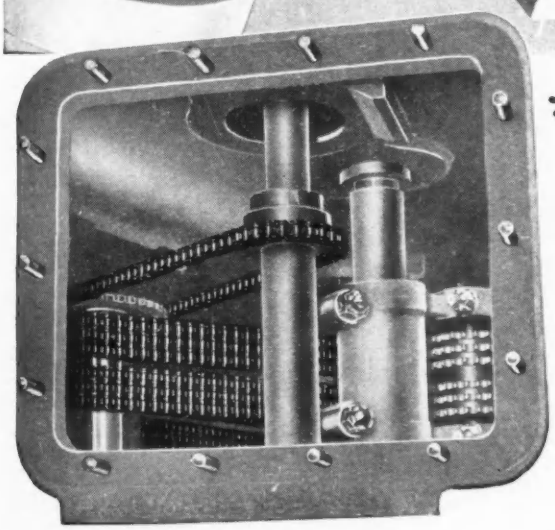

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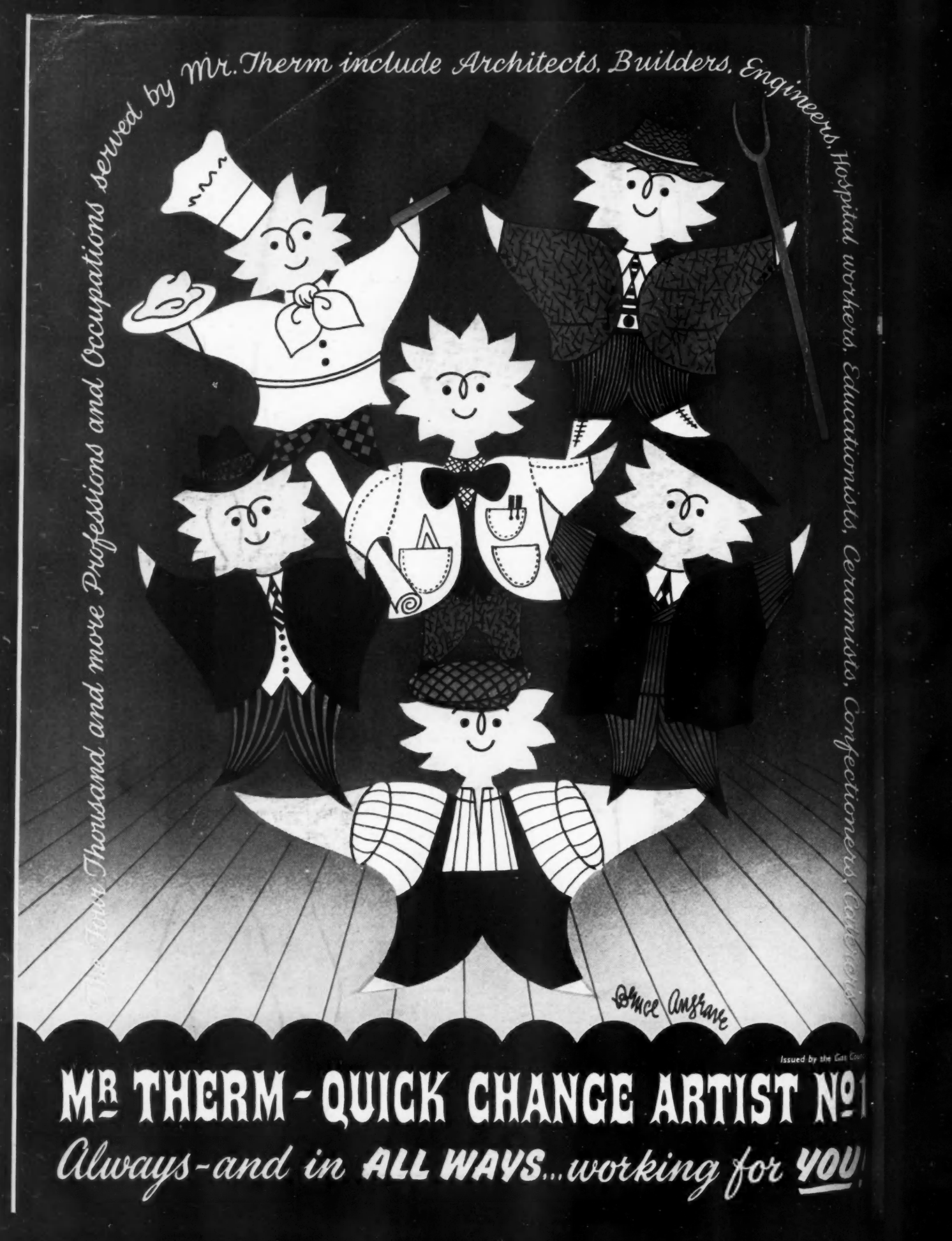
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